

**ANNEX I**  
**SUMMARY OF PRODUCT CHARACTERISTICS**

## 1. NAME OF THE MEDICINAL PRODUCT

Pradaxa 75 mg hard capsules

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each hard capsule contains 75 mg of dabigatran etexilate (as mesilate).

For the full list of excipients, see section 6.1.

## 3. PHARMACEUTICAL FORM

Hard capsule

Capsules with white, opaque cap and white, opaque body of size 2 filled with yellowish pellets. The cap is imprinted with the Boehringer Ingelheim company symbol, the body with "R75".

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Primary prevention of venous thromboembolic events in adult patients who have undergone elective total hip replacement surgery or total knee replacement surgery.

### 4.2 Posology and method of administration

#### Posology

#### Primary Prevention of Venous Thromboembolism in Orthopaedic Surgery (pVTEp orthopaedic surgery)

##### *Patients following elective knee replacement surgery*

The recommended dose of Pradaxa is 220 mg once daily taken as 2 capsules of 110 mg. Treatment should be initiated orally within 1-4 hours of completed surgery with a single 110 mg capsule and continuing with 2 capsules once daily thereafter for a total of 10 days.

##### *Patients following elective hip replacement surgery*

The recommended dose of Pradaxa is 220 mg once daily taken as 2 capsules of 110 mg. Treatment should be initiated orally within 1-4 hours of completed surgery with a single 110 mg capsule and continuing with 2 capsules once daily thereafter for a total of 28-35 days.

For the following groups the recommended daily dose of Pradaxa is 150 mg taken once daily as 2 capsules of 75 mg.

Treatment should be initiated orally within 1-4 hours of completed surgery with a single 75 mg capsule and continuing with 2 capsules once daily thereafter for a total of 10 days (knee replacement surgery) or 28-35 days (hip replacement surgery):

- Patients with moderate renal impairment (creatinine clearance, CrCL 30-50 mL/min) [see Renal impairment (pVTEp orthopaedic surgery)]

- Patients who receive concomitant verapamil, amiodarone, quinidine [see Concomitant use of Pradaxa with mild to moderate P-glycoprotein (P-gp) inhibitors, i.e. amiodarone, quinidine or verapamil (pVTEp orthopaedic surgery)]
- Patients aged 75 or above [see Elderly (pVTEp orthopaedic surgery)]

For both surgeries, if haemostasis is not secured, initiation of treatment should be delayed. If treatment is not started on the day of surgery then treatment should be initiated with 2 capsules once daily.

Assessment of renal function (*pVTEp orthopaedic surgery*):

In all patients:

- Renal function should be assessed by calculating the creatine clearance (CrCL) prior to initiation of treatment with Pradaxa to exclude patients with severe renal impairment (i.e. CrCL < 30 mL/min) (see sections 4.3, 4.4 and 5.2). Pradaxa is contraindicated in patients with severe renal impairment
- Renal function should also be assessed when a decline in renal function is suspected during treatment (e.g. hypovolaemia, dehydration, and in case of concomitant use of certain medicinal products )

The method used to estimate renal function (CrCL in mL/min) during the clinical development of Pradaxa was the Cockcroft-Gault method. The formula is as follows:

- For creatinine in  $\mu\text{mol/L}$ :

$$\frac{1.23 \times (140 - \text{age [years]}) \times \text{weight [kg]} (\times 0.85 \text{ if female})}{\text{serum creatinine } [\mu\text{mol/L}]}$$

- For creatinine in mg/dL:

$$\frac{(140 - \text{age [years]}) \times \text{weight [kg]} (\times 0.85 \text{ if female})}{72 \times \text{serum creatinine [mg/dL]}}$$

This method is recommended when assessing patients' CrCL prior to and during Pradaxa treatment.

### Special populations

#### Renal impairment pVTEp orthopaedic surgery

Treatment with Pradaxa in patients with severe renal impairment (CrCL < 30 mL/min) is contraindicated (see section 4.3).

In patients with moderate renal impairment (CrCL 30-50 mL/min), there is limited clinical experience. These patients should be treated with caution. The recommended dose is 150 mg taken once daily as 2 capsules of 75 mg (see sections 4.4 and 5.1).

#### Concomitant use of Pradaxa with mild to moderate P-glycoprotein (P-gp) inhibitors, i.e. amiodarone, quinidine or verapamil (pVTEp orthopaedic surgery)

Dosing should be reduced to 150 mg taken once daily as 2 capsules of 75 mg Pradaxa in patients who receive concomitantly dabigatran etexilate and amiodarone, quinidine or verapamil (see sections 4.4 and 4.5). In this situation Pradaxa and these medicinal products should be taken at the same time.

In patients with moderate renal impairment and concomitantly treated with dabigatran etexilate and verapamil, a dose reduction of Pradaxa to 75 mg daily should be considered (see sections 4.4 and 4.5).

#### Elderly (pVTEp orthopaedic surgery)

In elderly patients (> 75 years) there is limited clinical experience. These patients should be treated with caution. The recommended dose is 150 mg taken once daily as 2 capsules of 75 mg (see sections 4.4 and 5.1).

As renal impairment may be frequent in the elderly (>75 years), renal function should be assessed by calculating the CrCL prior to initiation of treatment with Pradaxa to exclude patients with severe renal impairment (i.e. CrCL < 30 mL/min). While on treatment the renal function should also be assessed in certain clinical situations when it is suspected that the renal function could decline or deteriorate (such as hypovolemia, dehydration, and with certain comedications, etc) (see sections 4.3, 4.4 and 5.2).

#### Hepatic impairment (pVTEp orthopaedic surgery)

Patients with elevated liver enzymes > 2 upper limit of normal (ULN) were excluded in clinical trials investigating the VTE prevention following elective hip or knee replacement surgery. No treatment experience is available for this subpopulation of patients, and therefore the use of Pradaxa is not recommended in this population (see sections 4.4 and 5.2). Hepatic impairment or liver disease expected to have any impact on survival is contraindicated (see section 4.3).

#### Weight (pVTEp orthopaedic surgery)

There is very limited clinical experience in patients with a body weight < 50 kg or > 110 kg at the recommended posology. Given the available clinical and kinetic data no adjustment is necessary (see section 5.2), but close clinical surveillance is recommended (see section 4.4).

#### Gender (pVTEp orthopaedic surgery)

Given the available clinical and kinetic data, no dose adjustment is necessary (see section 5.2).

#### Switching (pVTEp orthopaedic surgery)

##### *Pradaxa treatment to parenteral anticoagulant*

It is recommended to wait 24 hours after the last dose before switching from Pradaxa to a parenteral anticoagulant (see section 4.5).

##### *Parenteral anticoagulants to Pradaxa*

Discontinue the parenteral anticoagulant and start dabigatran etexilate 0-2 hours prior to the time that the next dose of the alternate therapy would be due, or at the time of discontinuation in case of continuous treatment (e.g. intravenous Unfractionated Heparin (UFH)) (see section 4.5).

#### Paediatric population (pVTEp orthopaedic surgery)

There is no relevant use of Pradaxa in the paediatric population for the indication of primary prevention of venous thromboembolic events in patients who have undergone elective total hip replacement surgery or total knee replacement surgery.

#### Missed dose (pVTEp orthopaedic surgery)

It is recommended to continue with the remaining daily doses of dabigatran etexilate at the same time of the next day.

No double dose should be taken to make up for missed individual doses.

### Method of administration (*pVTEp orthopaedic surgery*)

Pradaxa can be taken with or without food. Pradaxa should be swallowed as a whole with a glass of water, to facilitate delivery to the stomach.

Patients should be instructed not to open the capsule as this may increase the risk of bleeding (see sections 5.2 and 6.6).

### **4.3 Contraindications**

- Hypersensitivity to the active substance or to any of the excipients listed in section 6.1
- Patients with severe renal impairment (CrCL < 30 mL/min) (see section 4.2)
- Active clinically significant bleeding
- Lesion or condition, if considered a significant risk factor for major bleeding. This may include current or recent gastrointestinal ulceration, presence of malignant neoplasms at high risk of bleeding, recent brain or spinal injury, recent brain, spinal or ophthalmic surgery, recent intracranial haemorrhage, known or suspected oesophageal varices, arteriovenous malformations, vascular aneurysms or major intraspinal or intracerebral vascular abnormalities
- Concomitant treatment with any other anticoagulants e.g. unfractionated heparin (UFH), low molecular weight heparins (enoxaparin, dalteparin etc), heparin derivatives (fondaparinux etc), oral anticoagulants (warfarin, rivaroxaban, apixaban etc) except under specific circumstances of switching anticoagulant therapy (see section 4.2) or when UFH is given at doses necessary to maintain an open central venous or arterial catheter (see section 4.5)
- Hepatic impairment or liver disease expected to have any impact on survival
- Concomitant treatment with systemic ketoconazole, cyclosporine, itraconazole and dronedarone (see section 4.5)
- Prosthetic heart valves requiring anticoagulant treatment (see section 5.1).

### **4.4 Special warnings and precautions for use**

#### Hepatic impairment

Patients with elevated liver enzymes > 2 ULN were excluded in controlled clinical trials investigating the VTE prevention following elective hip or knee replacement surgery. No treatment experience is available for this subpopulation of patients, and therefore the use of Pradaxa is not recommended in this population.

#### Haemorrhagic risk

Dabigatran etexilate should be used with caution in conditions with an increased risk of bleeding and in situations with concomitant use of drugs affecting haemostasis by inhibition of platelet aggregation. Bleeding can occur at any site during therapy with dabigatran etexilate. An unexplained fall in haemoglobin and/or haematocrit or blood pressure should lead to a search for a bleeding site.

For situations of life-threatening or uncontrolled bleeding, when rapid reversal of the anticoagulation effect of dabigatran is required, the specific reversal agent (Praxbind, idarucizumab) is available (see section 4.9).

Factors, such as decreased renal function (30-50 mL/min CrCL), age  $\geq$  75 years, low body weight < 50 kg, or mild to moderate P-gp inhibitor co-medication (e.g. amiodarone, quinidine or verapamil) are associated with increased dabigatran plasma levels (see sections 4.2, 4.5 and 5.2).

The concomitant use of ticagrelor increases the exposure to dabigatran and may show pharmacodynamic interaction, which may result in an increased risk of bleeding (see section 4.5).

Use of acetylsalicylic acid (ASA), clopidogrel or non steroidal antiinflammatory drug (NSAID), as well as the presence of esophagitis, gastritis or gastroesophageal reflux increase the risk of GI bleeding. The administration of a PPI can be considered to prevent GI bleeding.

Bleeding risk may be increased in patients concomitantly treated with selective serotonin re-uptake inhibitors (SSRIs) or selective serotonin norepinephrine re-uptake inhibitors (SNRIs) (see section 4.5).

Close clinical surveillance (looking for signs of bleeding or anaemia) is recommended throughout the treatment period, especially if risk factors are combined (see section 5.1).

Table 1 summarises factors which may increase the haemorrhagic risk. Please also refer to contraindications in section 4.3.

Table 1: Factors which may increase the haemorrhagic risk.

Pharmacodynamic and kinetic factors	Age $\geq$ 75 years
Factors increasing dabigatran plasma levels	<p><u>Major:</u></p> <ul style="list-style-type: none"> <li>Moderate renal impairment (30-50 mL/min CrCL)</li> <li>P-gp inhibitor co-medication (some P-gp inhibitors are contraindicated, see section 4.3 and 4.5)</li> </ul> <p><u>Minor:</u></p> <ul style="list-style-type: none"> <li>Low body weight (&lt; 50 kg)</li> </ul>
Pharmacodynamic interactions	<ul style="list-style-type: none"> <li>ASA</li> <li>NSAID</li> <li>Clopidogrel</li> <li>SSRIs or SNRIs</li> <li>Other drugs which may impair haemostasis</li> </ul>
Diseases / procedures with special haemorrhagic risks	<ul style="list-style-type: none"> <li>Congenital or acquired coagulation disorders</li> <li>Thrombocytopenia or functional platelet defects</li> <li>Recent biopsy, major trauma</li> <li>Bacterial endocarditis</li> <li>Esophagitis, gastritis or gastroesophageal reflux</li> </ul>

The presence of lesions, conditions, procedures and/or pharmacological treatment (such as NSAIDs, antiplatelets, SSRIs and SNRIs, see section 4.5), which significantly increase the risk of major bleeding requires a careful benefit-risk assessment. Pradaxa should only be given if the benefit outweighs bleeding risks.

Pradaxa does not in general require routine anticoagulant monitoring. However, the measurement of dabigatran related anticoagulation may be helpful to avoid excessive high exposure to dabigatran in the presence of additional risk factors. The INR test is unreliable in patients on Pradaxa and false positive INR elevations have been reported. Therefore INR tests should not be performed. Diluted thrombin time (dTT), ecarin clotting time (ECT) and activated partial thromboplastin time (aPTT) may provide useful information, but the tests are not standardised, and results should be interpreted with caution (see section 5.1).

Table 2 shows coagulation test thresholds at trough that may be associated with an increased risk of bleeding (see section 5.1)

Table 2: Coagulation test thresholds at trough that may be associated with an increased risk of bleeding.

Test (trough value)	
dTT [ng/mL]	> 67
ECT [x-fold upper limit of normal]	No data
aPTT [x-fold upper limit of normal]	> 1.3
INR	Should not be performed

Patients who develop acute renal failure must discontinue Pradaxa (see section 4.3).

Limited data is available in patients < 50 kg (see section 5.2).

When severe bleedings occur treatment must be discontinued and the source of bleeding investigated (see section 4.9).

Medicinal products that may enhance the risk of haemorrhage should not be administered concomitantly or should be administered with caution with Pradaxa (see section 4.5).

#### Use of fibrinolytic medicinal products for the treatment of acute ischemic stroke

The use of fibrinolytic medicinal products for the treatment of acute ischemic stroke may be considered if the patient presents with a dTT, ECT or aPTT not exceeding the ULN according to the local reference range.

#### Interaction with P-gp inducers

Concomitant administration of P-gp inducers (such as rifampicin, St. John`s wort (*Hypericum perforatum*), carbamazepine, or phenytoin) is expected to result in decreased dabigatran plasma concentrations, and should be avoided (see sections 4.5 and 5.2).

#### Surgery and interventions

Patients on dabigatran etexilate who undergo surgery or invasive procedures are at increased risk for bleeding. Therefore surgical interventions may require the temporary discontinuation of dabigatran etexilate.

Caution should be exercised when treatment is temporarily discontinued for interventions and anticoagulant monitoring is warranted. Clearance of dabigatran in patients with renal insufficiency may take longer (see section 5.2). This should be considered in advance of any procedures. In such cases a coagulation test (see sections 4.4 and 5.1) may help to determine whether haemostasis is still impaired.

#### *Emergency surgery or urgent procedures*

Dabigatran etexilate should be temporarily discontinued. When rapid reversal of the anticoagulation effect is required the specific reversal agent (Praxbind, idarucizumab) to Pradaxa is available.

Reversing dabigatran therapy exposes patients to the thrombotic risk of their underlying disease. Pradaxa treatment can be re-initiated 24 hours after administration of Praxbind (idarucizumab), if the patient is clinically stable and adequate haemostasis has been achieved.

#### *Subacute surgery/interventions*

Dabigatran etexilate should be temporarily discontinued. A surgery / intervention should be delayed if possible until at least 12 hours after the last dose. If surgery cannot be delayed the risk of bleeding may be increased. This risk of bleeding should be weighed against the urgency of intervention.

### *Elective surgery*

If possible, Pradaxa should be discontinued at least 24 hours before invasive or surgical procedures. In patients at higher risk of bleeding or in major surgery where complete haemostasis may be required consider stopping Pradaxa 2-4 days before surgery. Clearance of dabigatran in patients with renal insufficiency may take longer. This should be considered in advance of any procedures.

Table 3 summarises discontinuation rules before invasive or surgical procedures.

Table 3: Discontinuation rules before invasive or surgical procedures

Renal function (CrCL in mL/min)	Estimated half-life (hours)	Stop dabigatran before elective surgery	
		High risk of bleeding or major surgery	Standard risk
≥ 80	~ 13	2 days before	24 hours before
≥ 50-< 80	~ 15	2-3 days before	1-2 days before
≥ 30-< 50	~ 18	4 days before	2-3 days before (> 48 hours)

### Spinal anaesthesia/epidural anaesthesia/lumbar puncture

Procedures such as spinal anaesthesia may require complete haemostatic function.

The risk of spinal or epidural haematoma may be increased in cases of traumatic or repeated puncture and by the prolonged use of epidural catheters. After removal of a catheter, an interval of at least 2 hours should elapse before the administration of the first dose of dabigatran etexilate. These patients require frequent observation for neurological signs and symptoms of spinal or epidural haematoma.

### Postoperative phase

Dabigatran etexilate should be restarted after the invasive procedure or surgical intervention as soon as possible provided the clinical situation allows and adequate haemostasis has been established.

Patients at risk for bleeding or patients at risk of overexposure, notably patients with moderate renal impairment (CrCL 30-50 mL/min), should be treated with caution (see sections 4.4 and 5.1).

### Patients at high surgical mortality risk and with intrinsic risk factors for thromboembolic events

There are limited efficacy and safety data for dabigatran available in these patients and therefore they should be treated with caution.

### Hip fracture surgery

There is no data on the use of Pradaxa in patients undergoing hip fracture surgery. Therefore treatment is not recommended.

## **4.5 Interaction with other medicinal products and other forms of interaction**

### Anticoagulants and antiplatelet aggregation medicinal products

There is no or only limited experience with the following treatments which may increase the risk of bleeding when used concomitantly with Pradaxa: anticoagulants such as unfractionated heparin (UFH), low molecular weight heparins (LMWH), and heparin derivatives (fondaparinux, desirudin), thrombolytic medicinal products, and vitamin K antagonists, rivaroxaban or other oral anticoagulants (see section 4.3), and platelet aggregation medicinal products such as, GPIIb/IIIa receptor antagonists, ticlopidine, prasugrel, ticagrelor, dextran, and sulfinpyrazone (see section 4.4).



UFH can be administered at doses necessary to maintain a patent central venous or arterial catheter (see sections 4.3).

Clonidogrel: In a phase I study in young healthy male volunteers, the concomitant administration of dabigatran etexilate and clonidogrel resulted in no further prolongation of capillary bleeding times compared to clonidogrel monotherapy. In addition, dabigatran AUC<sub>τ,ss</sub> and C<sub>max,ss</sub> and the coagulation measures for dabigatran effect or the inhibition of platelet aggregation as measure of clonidogrel effect remained essentially unchanged comparing combined treatment and the respective mono-treatments. With a loading dose of 300 mg or 600 mg clonidogrel, dabigatran AUC<sub>τ,ss</sub> and C<sub>max,ss</sub> were increased by about 30-40 % (see section 4.4).

ASA: The effect of concomitant administration of dabigatran etexilate and ASA on the risk of bleeds was studied in patients with atrial fibrillation in a phase II study in which a randomized ASA co-administration was applied. Based on logistic regression analysis, co-administration of ASA and 150 mg dabigatran etexilate twice daily may increase the risk for any bleeding from 12 % to 18 % and 24 % with 81 mg and 325 mg ASA, respectively (see section 4.4).

NSAIDs: NSAIDs given for short-term perioperative analgesia have been shown not to be associated with increased bleeding risk when given in conjunction with dabigatran etexilate. With chronic use NSAIDs increased the risk of bleeding by approximately 50 % on both dabigatran etexilate and warfarin. Therefore, due to the risk of haemorrhage, notably with NSAIDs with elimination half-lives > 12 hours, close observation for signs of bleeding is recommended (see section 4.4).

LMWH: The concomitant use of LMWHs, such as enoxaparin and dabigatran etexilate has not been specifically investigated. After switching from 3-day treatment of once daily 40 mg enoxaparin s.c., 24 hours after the last dose of enoxaparin the exposure to dabigatran was slightly lower than that after administration of dabigatran etexilate (single dose of 220 mg) alone. A higher anti-FXa/FIIa activity was observed after dabigatran etexilate administration with enoxaparin pre-treatment compared to that after treatment with dabigatran etexilate alone. This is considered to be due to the carry-over effect of enoxaparin treatment, and regarded as not clinically relevant. Other dabigatran related anti-coagulation tests were not changed significantly by the pre-treatment of enoxaparin.

#### Interactions linked to dabigatran etexilate and dabigatran metabolic profile

Dabigatran etexilate and dabigatran are not metabolised by the cytochrome P450 system and have no *in vitro* effects on human cytochrome P450 enzymes. Therefore, related medicinal product interactions are not expected with dabigatran.

#### Transporter interactions

##### *P-gp inhibitors*

Dabigatran etexilate is a substrate for the efflux transporter P-gp. Concomitant administration of P-gp inhibitors (such as amiodarone, verapamil, quinidine, ketoconazole, dronedarone, clarithromycin and ticagrelor) is expected to result in increased dabigatran plasma concentrations.

If not otherwise specifically described, close clinical surveillance (looking for signs of bleeding or anaemia) is required when dabigatran is co-administered with strong P-gp inhibitors. A coagulation test helps to identify patients with an increased bleeding risk due to increased dabigatran exposure (see sections 4.2, 4.4 and 5.1).

The following strong P-gp inhibitors are contraindicated: systemic ketoconazole, cyclosporine, itraconazole and dronedarone (see section 4.3). Concomitant treatment with tacrolimus is not recommended. Caution should be exercised with mild to moderate P-gp inhibitors (e.g. amiodarone, posaconazole, quinidine, verapamil and ticagrelor) (see sections 4.2 and 4.4).

**Ketoconazole:** Ketoconazole increased total dabigatran  $AUC_{0-\infty}$  and  $C_{max}$  values by 138 % and 135 %, respectively, after a single oral dose of 400 mg, and 153 % and 149 %, respectively, after multiple oral dosing of 400 mg ketoconazole once daily. The time to peak, terminal half-life and mean residence time were not affected by ketoconazole (see section 4.4). Concomitant treatment with systemic ketoconazole is contraindicated (see section 4.3).

**Dronedarone:** When dabigatran etexilate and dronedarone were given at the same time total dabigatran  $AUC_{0-\infty}$  and  $C_{max}$  values increased by about 2.4-fold and 2.3-fold (+136 % and 125 %), respectively, after multiple dosing of 400 mg dronedarone bid, and about 2.1-fold and 1.9-fold (+114 % and 87 %), respectively, after a single dose of 400 mg. The terminal half-life and renal clearance of dabigatran were not affected by dronedarone. When single and multiple doses of dronedarone were given 2 h after dabigatran etexilate, the increases in dabigatran  $AUC_{0-\infty}$  were 1.3-fold and 1.6-fold, respectively. Concomitant treatment with dronedarone is contraindicated.

**Amiodarone:** When Pradaxa was co-administered with a single oral dose of 600 mg amiodarone, the extent and rate of absorption of amiodarone and its active metabolite DEA were essentially unchanged. The dabigatran  $AUC$  and  $C_{max}$  were increased by about 60 % and 50 %, respectively. The mechanism of the interaction has not been completely clarified. In view of the long half-life of amiodarone the potential for drug interaction may exist for weeks after discontinuation of amiodarone (see sections 4.2 and 4.4).

Patients treated for prevention of VTEs after hip or knee replacement surgery, dosing should be reduced to 150 mg taken once daily as 2 capsules of 75 mg Pradaxa if they receive concomitantly dabigatran etexilate and amiodarone (see section 4.2). Close clinical surveillance is recommended when dabigatran etexilate is combined with amiodarone and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

**Quinidine:** Quinidine was given as 200 mg dose every 2nd hour up to a total dose of 1,000 mg. Dabigatran etexilate was given twice daily over 3 consecutive days, on the 3<sup>rd</sup> day either with or without quinidine. Dabigatran  $AUC_{t,ss}$  and  $C_{max,ss}$  were increased on average by 53 % and 56 %, respectively with concomitant quinidine (see sections 4.2 and 4.4).

Patients treated for prevention of VTEs after hip or knee replacement surgery, dosing should be reduced to 150 mg taken once daily as 2 capsules of 75 mg Pradaxa if they receive concomitantly dabigatran etexilate and quinidine (see section 4.2). Close clinical surveillance is recommended when dabigatran etexilate is combined with quinidine and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

**Verapamil:** When dabigatran etexilate (150 mg) was co-administered with oral verapamil, the  $C_{max}$  and  $AUC$  of dabigatran were increased but magnitude of this change differs depending on timing of administration and formulation of verapamil (see sections 4.2 and 4.4).

The greatest elevation of dabigatran exposure was observed with the first dose of an immediate release formulation of verapamil administered one hour prior to dabigatran etexilate intake (increase of  $C_{max}$  by about 180 % and  $AUC$  by about 150 %). The effect was progressively decreased with administration of an extended release formulation (increased of  $C_{max}$  by about 90 % and  $AUC$  by about 70 %) or administration of multiple doses of verapamil (increased of  $C_{max}$  by about 60 % and  $AUC$  by about 50 %).

Therefore, close clinical surveillance (looking for signs of bleeding or anaemia) is required when dabigatran is co-administered with verapamil. In patients with normal renal function after the hip or knee replacement surgery, receiving dabigatran etexilate and verapamil concomitantly, the dose of Pradaxa should be reduced to 150 mg taken once daily as 2 capsules of 75 mg. In patients with moderate renal impairment and concomitantly treated with dabigatran etexilate and verapamil, a dose reduction of Pradaxa to 75 mg daily should be considered (see sections 4.2 and 4.4). Close clinical surveillance is recommended when dabigatran etexilate is combined with verapamil and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

There was no meaningful interaction observed when verapamil was given 2 hours after dabigatran etexilate (increased of  $C_{max}$  by about 10 % and AUC by about 20 %). This is explained by completed dabigatran absorption after 2 hours (see section 4.4).

Clarithromycin: When clarithromycin (500 mg twice daily) was administered together with dabigatran etexilate in healthy volunteers, increase of AUC by about 19 % and  $C_{max}$  by about 15 % was observed without any clinical safety concern. However, in patients receiving dabigatran, a clinically relevant interaction cannot be excluded when combined with clarithromycin. Therefore, a close monitoring should be exercised when dabigatran etexilate is combined with clarithromycin and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

Ticagrelor: When a single dose of 75mg dabigatran etexilate was coadministered simultaneously with a loading dose of 180 mg ticagrelor, the dabigatran AUC and  $C_{max}$  were increased by 1.73-fold and 1.95-fold (+73% and 95 %), respectively. After multiplied doses of ticagrelor 90 mg b.i.d. the increase of dabigatran exposure is 1.56-fold and 1.46-fold (+56% and 46%) for  $C_{max}$  and AUC, respectively.

Concomitant administration of a loading dose of 180 mg ticagrelor and 110 mg dabigatran etexilate (in steady state) increased the dabigatran AUC $_{\tau,ss}$  and  $C_{max,ss}$  by 1.49-fold and 1.65-fold (+49% and 65%), respectively, compared with dabigatran etexilate given alone. When a loading dose of 180 mg ticagrelor was given 2 hours after 110 mg dabigatran etexilate (in steady state), the increase of dabigatran AUC $_{\tau,ss}$  and  $C_{max,ss}$  was reduced to 1.27-fold and 1.23-fold (+27% and 23%), respectively, compared with dabigatran etexilate given alone. This staggered intake is the recommended administration for start of ticagrelor with a loading dose.

Concomitant administration of 90 mg ticagrelor BID (maintenance dose) with 110 mg dabigatran etexilate increased the adjusted dabigatran AUC $_{\tau,ss}$  and  $C_{max,ss}$  1.26-fold and 1.29-fold, respectively, compared with dabigatran etexilate given alone.

The following potent P-gp inhibitors have not been clinically studied but from *in vitro* results a similar effect as with ketoconazole may be expected:

Itraconazole and cyclosporine, which are contra-indicated (see section 4.3).

Tacrolimus has been found *in vitro* to have a similar level of inhibitory effect on P-gp as that seen with itraconazole and cyclosporine. Dabigatran etexilate has not been clinically studied together with tacrolimus. However, limited clinical data with another P-gp substrate (everolimus) suggest that the inhibition of P-gp with tacrolimus is weaker than that observed with strong P-gp inhibitors. Based on these data concomitant treatment with tacrolimus is not recommended.

Posaconazole also inhibits P-gp to some extent but has not been clinically studied. Caution should be exercised when Pradaxa is co-administered with posaconazole.

#### P-gp inducers

Concomitant administration of a P-gp inducer (such as rifampicin, St. John's wort (*Hypericum perforatum*), carbamazepine, or phenytoin) is expected to result in decreased dabigatran concentrations and should be avoided (see sections 4.4 and 5.2).

Rifampicin: Pre-dosing of the probe inducer rifampicin at a dose of 600 mg once daily for 7 days decreased total dabigatran peak and total exposure by 65.5 and 67 %, respectively. The inducing effect was diminished resulting in dabigatran exposure close to the reference by day 7 after cessation of rifampicin treatment. No further increase in bioavailability was observed after another 7 days.

#### Other medicinal products affecting P-gp

Protease inhibitors including ritonavir and its combinations with other protease inhibitors affect P-gp (either as inhibitor or as inducer). They have not been studied and are therefore not recommended for concomitant treatment with section .

### P-gp substrate

Digoxin: In a study performed with 24 healthy subjects, when Pradaxa was co-administered with digoxin, no changes on digoxin and no clinical relevant changes on dabigatran exposure have been observed.

### Co-medication with selective serotonin re-uptake inhibitors (SSRIs) or selective serotonin norepinephrine re-uptake inhibitors (SNRIs)

SSRIs and SNRIs increased the risk of bleeding in RE-LY in all treatment groups.

### Gastric pH

Pantoprazole: When Pradaxa was co-administered with pantoprazole, a decrease in the dabigatran area under the plasma concentration-time curve of approximately 30 % was observed. Pantoprazole and other proton-pump inhibitors (PPI) were co-administered with Pradaxa in clinical trials, and concomitant PPI treatment did not appear to reduce the efficacy of Pradaxa.

Ranitidine: Ranitidine administration together with Pradaxa had no clinically relevant effect on the extent of absorption of dabigatran.

## **4.6 Fertility, pregnancy and lactation**

### Women of childbearing potential / Contraception in males and females

Women of childbearing potential should avoid pregnancy during treatment with dabigatran etexilate.

### Pregnancy

There are limited amount of data from the use of dabigatran etexilate in pregnant women. Studies in animals have shown reproductive toxicity (see section 5.3). The potential risk for humans is unknown.

Pradaxa should not be used during pregnancy unless clearly necessary.

### Breast-feeding

There are no clinical data of the effect of dabigatran on infants during breast-feeding. Breast-feeding should be discontinued during treatment with Pradaxa.

### Fertility

No human data available.

In animal studies an effect on female fertility was observed in the form of a decrease in implantations and an increase in pre-implantation loss at 70 mg/kg (representing a 5-fold higher plasma exposure level compared to patients). No other effects on female fertility were observed. There was no influence on male fertility. At doses that were toxic to the mothers (representing a 5- to 10-fold higher plasma exposure level to patients), a decrease in foetal body weight and embryofoetal viability along with an increase in foetal variations were observed in rats and rabbits. In the pre- and post-natal study, an increase in foetal mortality was observed at doses that were toxic to the dams (a dose corresponding to a plasma exposure level 4-fold higher than observed in patients).

## **4.7 Effects on ability to drive and use machines**

Pradaxa has no or negligible influence on the ability to drive and use machines.

## 4.8 Undesirable effects

### Summary of the safety profile

A total of 10,795 patients were treated in 6 actively controlled VTE prevention trials with at least one dose of the medicinal product. Of these 6,684 were treated with 150 mg or 220 mg daily of Pradaxa.

The most commonly reported adverse reactions are bleedings occurring in total in approximately 14 % of patients; the frequency of major bleeds (including wound site bleedings) is less than 2 %.

Although rare in frequency in clinical trials, major or severe bleeding may occur and, regardless of location, may lead to disabling, life-threatening or even fatal outcomes.

### Tabulated list of adverse reactions

Table 4 shows the adverse reactions ranked under headings of System Organ Classes (SOC) and frequency using the following convention: very common ( $\geq 1/10$ ), common ( $\geq 1/100$  to  $<1/10$ ), uncommon ( $\geq 1/1,000$  to  $<1/100$ ), rare ( $\geq 1/10,000$  to  $<1/1,000$ ), very rare ( $<1/10,000$ ), not known (cannot be estimated from the available data).

Table 4: Adverse reactions

SOC / Preferred term.	
Blood and lymphatic system disorders	
Haemoglobin decreased	Common
Anaemia	Uncommon
Haematocrit decreased	Uncommon
Thrombocytopenia	Rare
Immune system disorder	
Drug hypersensitivity	Uncommon
Anaphylactic reaction	Rare
Angioedema	Rare
Urticaria	Rare
Rash	Rare
Pruritus	Rare
Bronchospasm	Not known
Nervous system disorders	
Intracranial haemorrhage	Rare
Vascular disorders	
Haematoma	Uncommon
Wound haemorrhage	Uncommon
Haemorrhage	Rare
Respiratory, thoracic and mediastinal disorders	
Epistaxis	Uncommon
Haemoptysis	Rare
Gastrointestinal disorders	
Gastrointestinal haemorrhage	Uncommon
Rectal haemorrhage	Uncommon
Haemorrhoidal haemorrhage	Uncommon
Diarrhoea	Uncommon
Nausea	Uncommon
Vomiting	Uncommon
Gastrointestinal ulcer, including oesophageal ulcer	Rare
Gastroesophagitis	Rare

Gastroesophageal reflux disease	Rare
Abdominal pain	Rare
Dyspepsia	Rare
Dysphagia	Rare
Hepatobiliary disorders	
Hepatic function abnormal/ Liver function Test abnormal	Common
Alanine aminotransferase increased	Uncommon
Aspartate aminotransferase increased	Uncommon
Hepatic enzyme increased	Uncommon
Hyperbilirubinaemia	Uncommon
Skin and subcutaneous tissue disorder	
Skin haemorrhage	Uncommon
Musculoskeletal and connective tissue disorders	
Haemarthrosis	Uncommon
Renal and urinary disorders	
Genitourological haemorrhage, including haematuria	Uncommon
General disorders and administration site conditions	
Injection site haemorrhage	Rare
Catheter site haemorrhage	Rare
Bloody discharge	Rare
Injury, poisoning and procedural complications	
Traumatic haemorrhage	Uncommon
Post procedural haematoma	Uncommon
Post procedural haemorrhage	Uncommon
Post procedural discharge	Uncommon
Wound secretion	Uncommon
Incision site haemorrhage	Rare
Anaemia postoperative	Rare
Surgical and medical procedures	
Wound drainage	Rare
Post procedural drainage	Rare

### Bleeding

The table 5 shows the number (%) of patients experiencing the adverse reaction bleeding during the treatment period in the VTE prevention in the two pivotal clinical trials, according to dose.

Table 5: Number (%) of patients experiencing the adverse reaction bleeding

	Dabigatran etexilate 150 mg N (%)	Dabigatran etexilate 220 mg N (%)	Enoxaparin N (%)
Treated	1,866(100.0)	1,825(100.0)	1,848(100.0)
Major bleeding	24 (1.3)	33 (1.8)	27 (1.5)
Any bleeding	258(13.8)	251(13.8)	247(13.4)

The definition of the adverse reaction major bleeding in the RE-NOVATE and RE-MODEL studies were as follows:

- fatal bleeding
- clinically overt bleeding in excess of what was expected and associated with  $\geq 20$  g/L (corresponds to 1.24 mmol/L) fall in haemoglobin in excess of what was expected

- clinically overt bleeding in excess of what was expected and leading to transfusion of  $\geq 2$  units packed cells or whole blood in excess of what was expected
- symptomatic retroperitoneal, intracranial, intraocular or intraspinal bleeding
- bleeding requiring treatment cessation
- bleeding leading to re-operation

Objective testing was required for a retroperitoneal bleed (ultrasound or Computer Tomography (CT) scan) and for an intracranial and intraspinal bleed (CT scan or Magnetic Resonance Imaging).

#### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via **the national reporting system** listed in [Appendix V](#).

## **4.9 Overdose**

Doses of dabigatran etexilate beyond those recommended, expose the patient to increased risk of bleeding.

In case of an overdose suspicion, coagulation tests can help to determine a bleeding risk (see sections 4.4 and 5.1). A calibrated quantitative dTT test or repetitive dTT measurements allow prediction of the time by when certain dabigatran levels will be reached (see section 5.1), also in case additional measures e.g. dialysis have been initiated.

Excessive anticoagulation may require interruption of Pradaxa treatment. In the event of haemorrhagic complications, treatment must be discontinued and the source of bleeding investigated. Since dabigatran is excreted predominantly by the renal route adequate diuresis must be maintained. Depending on the clinical situation appropriate supportive treatment, such as surgical haemostasis and blood volume replacement, should be undertaken at the prescribers discretion.

For situations when rapid reversal of the anticoagulant effect of Pradaxa is required the specific reversal agent (Praxbind, idarucizumab) antagonizing the pharmacodynamics effect of Pradaxa is available (see section 4.4).

Coagulation factor concentrates (activated or non-activated) or recombinant Factor VIIa may be taken into account. There is some experimental evidence to support the role of these medicinal products in reversing the anticoagulant effect of dabigatran, but data on their usefulness in clinical settings and also on the possible risk of rebound thromboembolism is very limited. Coagulation tests may become unreliable following administration of suggested coagulation factor concentrates. Caution should be exercised when interpreting these tests. Consideration should also be given to administration of platelet concentrates in cases where thrombocytopenia is present or long acting antiplatelet drugs have been used. All symptomatic treatment should be given according to the physician's judgement.

Depending on local availability, a consultation of a coagulation expert should be considered in case of major bleedings.

As protein binding is low, dabigatran can be dialysed; there is limited clinical experience to demonstrate the utility of this approach in clinical studies (see section 5.2).

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: antithrombotic, direct thrombin inhibitors, ATC code: B01AE07.

## Mechanism of action

Dabigatran etexilate is a small molecule prodrug which does not exhibit any pharmacological activity. After oral administration, dabigatran etexilate is rapidly absorbed and converted to dabigatran by esterase-catalysed hydrolysis in plasma and in the liver. Dabigatran is a potent, competitive, reversible direct thrombin inhibitor and is the main active principle in plasma.

Since thrombin (serine protease) enables the conversion of fibrinogen into fibrin during the coagulation cascade, its inhibition prevents the development of thrombus. Dabigatran also inhibits free thrombin, fibrin-bound thrombin and thrombin-induced platelet aggregation.

## Pharmacodynamic effects

*In-vivo* and *ex-vivo* animal studies have demonstrated antithrombotic efficacy and anticoagulant activity of dabigatran after intravenous administration and of dabigatran etexilate after oral administration in various animal models of thrombosis.

There is a clear correlation between plasma dabigatran concentration and degree of anticoagulant effect based on phase II studies. Dabigatran prolongs the thrombin time (TT), ECT, and aPTT.

The calibrated quantitative diluted TT (dTT) test provides an estimation of dabigatran plasma concentration that can be compared to the expected dabigatran plasma concentrations. When the calibrated dTT assay delivers a dabigatran plasma concentration result at or below the limit of quantification, an additional coagulation assay such as TT, ECT or aPTT should be considered.

The ECT can provide a direct measure of the activity of direct thrombin inhibitors.

The aPTT test is widely available and provides an approximate indication of the anticoagulation intensity achieved with dabigatran. However, the aPTT test has limited sensitivity and is not suitable for precise quantification of anticoagulant effect, especially at high plasma concentrations of dabigatran. Although high aPTT values should be interpreted with caution, a high aPTT value indicates that the patient is anticoagulated.

In general, it can be assumed that these measures of anti-coagulant activity may reflect dabigatran levels and can provide guidance for the assessment of bleeding risk, i.e. exceeding the 90<sup>th</sup> percentile of dabigatran trough levels or a coagulation assay such as aPTT measured at trough (for aPTT thresholds see section 4.4, table 2) is considered to be associated with an increased risk of bleeding.

Steady state (after day 3) geometric mean dabigatran peak plasma concentration, measured around 2 hours after 220 mg dabigatran etexilate administration, was 70.8 ng/mL, with a range of 35.2-162 ng/mL (25<sup>th</sup>-75<sup>th</sup> percentile range). The dabigatran geometric mean trough concentration, measured at the end of the dosing interval (i.e. 24 hours after a 220 mg dabigatran dose), was on average 22.0 ng/mL, with a range of 13.0-35.7 ng/mL (25<sup>th</sup>-75<sup>th</sup> percentile range).

In a dedicated study exclusively in patients with moderate renal impairment (creatinine clearance, CrCL 30-50 mL/min) treated with dabigatran etexilate 150 mg QD, the dabigatran geometric mean trough concentration, measured at the end of the dosing interval, was on average 47.5 ng/mL, with a range of 29.6 - 72.2 ng/mL (25<sup>th</sup>-75<sup>th</sup> percentile range).

In patients treated for prevention of VTEs after hip or knee replacement surgery with 220 mg dabigatran etexilate once daily,

- the 90<sup>th</sup> percentile of dabigatran plasma concentrations was 67 ng/mL, measured at trough (20-28 hours after the previous dose) (see section 4.4 and 4.9),
- the 90<sup>th</sup> percentile of aPTT at trough (20-28 hours after the previous dose) was 51 seconds, which would be 1.3-fold upper limit of normal.

The ECT was not measured in patients treated for prevention of VTEs after hip or knee replacement surgery with 220 mg dabigatran etexilate once daily.



## Clinical efficacy and safety

### *Ethnic origin*

No clinically relevant ethnic differences among Caucasians, African-American, Hispanic, Japanese or Chinese patients were observed.

### *Clinical trials in Venous Thromboembolism (VTE) prophylaxis following major joint replacement surgery*

In 2 large randomized, parallel group, double-blind, dose-confirmatory trials, patients undergoing elective major orthopaedic surgery (one for knee replacement surgery and one for hip replacement surgery) received Pradaxa 75 mg or 110 mg within 1-4 hours of surgery followed by 150 mg or 220 mg daily thereafter, haemostasis having been secured, or enoxaparin 40 mg on the day prior to surgery and daily thereafter.

In the RE-MODEL trial (knee replacement) treatment was for 6-10 days and in the RE-NOVATE trial (hip replacement) for 28-35 days. Totals of 2,076 patients (knee) and 3,494 (hip) were treated respectively.

Composite of total VTE (including PE, proximal and distal DVT, whatever symptomatic or asymptomatic detected by routine venography) and all-cause mortality constituted the primary end-point for both studies. Composite of major VTE (including PE and proximal DVT, whatever symptomatic or asymptomatic detected by routine venography) and VTE-related mortality constituted a secondary end-point and is considered of better clinical relevance.

Results of both studies showed that the antithrombotic effect of Pradaxa 220 mg and 150 mg were statistically non-inferior to that of enoxaparin on total VTE and all-cause mortality. The point estimate for incidence of major VTE and VTE related mortality for the 150 mg dose was slightly worse than enoxaparin (table 6). Better results were seen with the 220 mg dose where the point estimate of Major VTE was slightly better than enoxaparin (table 6).

The clinical studies have been conducted in a patient population with a mean age > 65 years.

There were no differences in the phase 3 clinical studies for efficacy and safety data between men and women.

In the studied patient population of RE-MODEL and RE-NOVATE (5,539 patients treated), 51 % suffered from concomitant hypertension, 9 % from concomitant diabetes, 9 % from concomitant coronary artery disease and 20 % had a history of venous insufficiency. None of these diseases showed an impact on the effects of dabigatran on VTE-prevention or bleeding rates.

Data for the major VTE and VTE-related mortality endpoint were homogeneous with regards to the primary efficacy endpoint and are shown in table 6.

Data for the total VTE and all cause mortality endpoint are shown in table 7.

Data for adjudicated major bleeding endpoints are shown in table 8 below.

Table 6: Analysis of major VTE and VTE-related mortality during the treatment period in the RE-MODEL and the RE-NOVATE orthopaedic surgery studies

Trial	Dabigatran etexilate 220 mg	Dabigatran etexilate 150 mg	Enoxaparin 40 mg
RE-NOVATE (hip)			
N	909	888	917
Incidences (%)	28 (3.1)	38 (4.3)	36 (3.9)
Risk ratio over enoxaparin	0.78	1.09	
95 % CI	0.48, 1.27	0.70, 1.70	
RE-MODEL (knee)			
N	506	527	511
Incidences (%)	13 (2.6)	20 (3.8)	18 (3.5)
Risk ratio over enoxaparin	0.73	1.08	
95 % CI	0.36, 1.47	0.58, 2.01	

Table 7: Analysis of total VTE and all cause mortality during the treatment period in the RE-NOVATE and the RE-MODEL orthopaedic surgery studies

Trial	Dabigatran etexilate 220 mg	Dabigatran etexilate 150 mg	Enoxaparin 40 mg
RE-NOVATE (hip)			
N	880	874	897
Incidences (%)	53 (6.0)	75 (8.6)	60 (6.7)
Risk ratio over enoxaparin	0.9	1.28	
95 % CI	(0.63, 1.29)	(0.93, 1.78)	
RE-MODEL (knee)			
N	503	526	512
Incidences (%)	183 (36.4)	213 (40.5)	193 (37.7)
Risk ratio over enoxaparin	0.97	1.07	
95 % CI	(0.82, 1.13)	(0.92, 1.25)	

Table 8: Major bleeding events by treatment in the individual RE-MODEL and the RE-NOVATE studies

Trial	Dabigatran etexilate 220 mg	Dabigatran etexilate 150 mg	Enoxaparin 40 mg
RE-NOVATE (hip)			
Treated patients N	1,146	1,163	1,154
Number of MBE N(%)	23 (2.0)	15 (1.3)	18 (1.6)
RE-MODEL (knee)			
Treated patients N	679	703	694
Number of MBE N(%)	10 (1.5)	9 (1.3)	9 (1.3)

#### Paediatric population

The European Medicines Agency has waived the obligation to submit the results of studies with Pradaxa in all subsets of the paediatric population in prevention of thromboembolic events for the granted indication (see section 4.2 for information on paediatric use).

## *Clinical trials for the prevention of thromboembolism in patients with prosthetic heart valves*

A phase II study examined dabigatran etexilate and warfarin in a total of 252 patients with recent mechanical valve replacement surgery (i.e. within the current hospital stay) and in patients who received a mechanical heart valve replacement more than three months ago. More thromboembolic events (mainly strokes and symptomatic/asymptomatic prosthetic valve thrombosis) and more bleeding events were observed with dabigatran etexilate than with warfarin. In the early post-operative patients, major bleeding manifested predominantly as haemorrhagic pericardial effusions, specifically in patients who started dabigatran etexilate early (i.e. on Day 3) after heart valve replacement surgery (see section 4.3).

### **5.2 Pharmacokinetic properties**

After oral administration, dabigatran etexilate is rapidly and completely converted to dabigatran, which is the active form in plasma. The cleavage of the prodrug dabigatran etexilate by esterase-catalysed hydrolysis to the active principle dabigatran is the predominant metabolic reaction. The absolute bioavailability of dabigatran following oral administration of Pradaxa was approximately 6.5 %.

After oral administration of Pradaxa in healthy volunteers, the pharmacokinetic profile of dabigatran in plasma is characterized by a rapid increase in plasma concentrations with  $C_{max}$  attained within 0.5 and 2.0 hours post administration.

#### Absorption

A study evaluating post-operative absorption of dabigatran etexilate, 1-3 hours following surgery, demonstrated relatively slow absorption compared with that in healthy volunteers, showing a smooth plasma concentration-time profile without high peak plasma concentrations. Peak plasma concentrations are reached at 6 hours following administration in a postoperative period due to contributing factors such as anaesthesia, gastrointestinal paresis, and surgical effects independent of the oral medicinal product formulation. It was demonstrated in a further study that slow and delayed absorption is usually only present on the day of surgery. On subsequent days absorption of dabigatran is rapid with peak plasma concentrations attained 2 hours after medicinal product administration. Food does not affect the bioavailability of dabigatran etexilate but delays the time to peak plasma concentrations by 2 hours.

The oral bioavailability may be increased by 75 % after a single dose and 37 % at steady state compared to the reference capsule formulation when the pellets are taken without the Hydroxypropylmethylcellulose (HPMC) capsule shell. Hence, the integrity of the HPMC capsules should always be preserved in clinical use to avoid unintentionally increased bioavailability of dabigatran etexilate. Therefore, patients should be advised not to open the capsules and taking the pellets alone (e.g. sprinkled over food or into beverages) (see section 4.2).

#### Distribution

Low (34-35 %) concentration independent binding of dabigatran to human plasma proteins was observed. The volume of distribution of dabigatran of 60–70 L exceeded the volume of total body water indicating moderate tissue distribution of dabigatran.

$C_{max}$  and the area under the plasma concentration-time curve were dose proportional. Plasma concentrations of dabigatran showed a biexponential decline with a mean terminal half-life of 11 hours in healthy elderly subjects. After multiple doses a terminal half-life of about 12-14 hours was observed. The half-life was independent of dose. Half-life is prolonged if renal function is impaired as shown in table 9.

#### Biotransformation

Metabolism and excretion of dabigatran were studied following a single intravenous dose of radiolabeled dabigatran in healthy male subjects. After an intravenous dose, the dabigatran-derived

radioactivity was eliminated primarily in the urine (85 %). Faecal excretion accounted for 6 % of the administered dose. Recovery of the total radioactivity ranged from 88-94 % of the administered dose by 168 hours post dose.

Dabigatran is subject to conjugation forming pharmacologically active acylglucuronides. Four positional isomers, 1-O, 2-O, 3-O, 4-O-acylglucuronide exist, each accounts for less than 10 % of total dabigatran in plasma. Traces of other metabolites were only detectable with highly sensitive analytical methods. Dabigatran is eliminated primarily in the unchanged form in the urine, at a rate of approximately 100 mL/min corresponding to the glomerular filtration rate.

### Special populations

#### Renal insufficiency

In phase I studies the exposure (AUC) of dabigatran after the oral administration of Pradaxa is approximately 2.7-fold higher in volunteers with moderate renal insufficiency (CrCL between 30-50 mL/min) than in those without renal insufficiency.

In a small number of volunteers with severe renal insufficiency (CrCL 10-30 mL/min), the exposure (AUC) to dabigatran was approximately 6 times higher and the half-life approximately 2 times longer than that observed in a population without renal insufficiency (see sections 4.2, 4.3 and 4.4).

Table 9: Half-life of total dabigatran in healthy subjects and subjects with impaired renal function.

glomerular filtration rate (CrCL, [mL/min]	gMean (gCV%; range) half-life [h]
≥ 80	13.4 (25.7 %; 11.0-21.6)
≥ 50-< 80	15.3 (42.7 %; 11.7-34.1)
≥ 30-< 50	18.4 (18.5 %; 13.3-23.0)
< 30	27.2(15.3 %; 21.6-35.0)

Additionally, dabigatran exposure (at trough and peak) was assessed in a prospective open label randomized pharmacokinetic study in NVAf patients with severe renal impairment (defined as creatinine clearance [CrCl] 15-30 mL/min) receiving dabigatran etexilate 75 mg twice daily. This regimen resulted in a geometric mean trough concentration of 155 ng/ml (gCV of 76.9 %), measured immediately before administration of the next dose and in a geometric mean peak concentration of 202 ng/ml (gCV of 70.6 %) measured two hours after the administration of the last dose.

Clearance of dabigatran by haemodialysis was investigated in 7 patients with end-stage renal disease (ESRD) without atrial fibrillation. Dialysis was conducted with 700 mL/min dialysate flow rate, four hour duration and a blood flow rate of either 200 mL/min or 350-390 mL/min. This resulted in a removal of 50 % to 60 % of dabigatran concentrations, respectively. The amount of drug cleared by dialysis is proportional to the blood flow rate up to a blood flow rate of 300 mL/min. The anticoagulant activity of dabigatran decreased with decreasing plasma concentrations and the PK/PD relationship was not affected by the procedure.

#### Elderly patients

Specific pharmacokinetic phase I studies with elderly subjects showed an increase of 40 to 60 % in the AUC and of more than 25 % in  $C_{max}$  compared to young subjects.

The effect by age on exposure to dabigatran was confirmed in the RE-LY study with an about 31 % higher trough concentration for subjects ≥ 75 years and by about 22 % lower trough level for subjects < 65 years compared to subjects between 65 and 75 years (see sections 4.2 and 4.4).

#### Hepatic impairment

No change in dabigatran exposure was seen in 12 subjects with moderate hepatic insufficiency (Child Pugh B) compared to 12 controls (see sections 4.2 and 4.4).

### Body weight

The dabigatran trough concentrations were about 20 % lower in patients with a body weight > 100 kg compared with 50-100 kg. The majority (80.8 %) of the subjects were in the  $\geq 50$  kg and < 100 kg category with no clear difference detected (see sections 4.2 and 4.4). Limited clinical data in patients < 50 kg are available.

### Gender

Active substance exposure in the primary VTE prevention studies was about 40 % to 50 % higher in female patients and no dose adjustment is recommended.

### Ethnic origin

No clinically relevant inter-ethnic differences among Caucasian, African-American, Hispanic, Japanese or Chinese patients were observed regarding dabigatran pharmacokinetics and pharmacodynamics.

### Pharmacokinetic interactions

The pro-drug dabigatran etexilate but not dabigatran is a substrate of the efflux transporter P-gp. Therefore concomitant use of P-gp transporter inhibitors (amiodarone, verapamil, clarithromycin, quinidine, dronedarone, ticagrelor and ketoconazole) and inducers (rifampicin) had been investigated (see sections 4.2, 4.4 and 4.5).

*In vitro* interaction studies did not show any inhibition or induction of the principal isoenzymes of cytochrome P450. This has been confirmed by *in vivo* studies with healthy volunteers, who did not show any interaction between this treatment and the following active substances: atorvastatin (CYP3A4), digoxin (P-gp transporter interaction) and diclofenac (CYP2C9).

## **5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on conventional studies of safety pharmacology, repeated dose toxicity and genotoxicity.

Effects observed in the repeat-dose toxicity studies were due to the exaggerated pharmacodynamic effect of dabigatran.

An effect on female fertility was observed in the form of a decrease in implantations and an increase in pre-implantation loss at 70 mg/kg (5-fold the plasma exposure level in patients). At doses that were toxic to the mothers (5- to 10-fold the plasma exposure level in patients), a decrease in foetal body weight and viability along with an increase in foetal variations were observed in rats and rabbits. In the pre- and post-natal study, an increase in foetal mortality was observed at doses that were toxic to the dams (a dose corresponding to a plasma exposure level 4-fold higher than observed in patients).

In lifetime toxicology studies in rats and mice, there was no evidence for a tumorigenic potential of dabigatran up to maximum doses of 200 mg/kg.

Dabigatran, the active moiety of dabigatran etexilate mesilate, is persistent in the environment.

## **6. PHARMACEUTICAL PARTICULARS**

### **6.1 List of excipients**

#### Capsule fill

- Tartaric acid
- Acacia
- Hypromellose

- Dimeticone 350
- Talc
- Hydroxypropylcellulose

#### Capsule shell

- Carrageenan
- Potassium chloride
- Titanium dioxide
- Hypromellose

#### Black printing ink

- Shellac
- Iron oxide black (E172)
- Potassium hydroxide

### **6.2 Incompatibilities**

Not applicable.

### **6.3 Shelf life**

Blister and bottle: 3 years

Once the bottle is opened, the medicinal product must be used within 4 months.

### **6.4 Special precautions for storage**

#### Blister

Store in the original package in order to protect from moisture.

#### Bottle

Store in the original package in order to protect from moisture. Keep the bottle tightly closed.

### **6.5 Nature and contents of container**

Cartons containing 10 x 1, 30 x 1 or 60 x 1 hard capsules in perforated aluminium unit dose blisters. Furthermore, cartons containing 6 blister strips (60 x 1) in perforated aluminium unit dose white blisters.

Polypropylene bottle with a screw cap containing 60 hard capsules.

Not all pack sizes may be marketed.

### **6.6 Special precautions for disposal and other handling**

When taking Pradaxa capsules out of the blister pack, the following instructions should be followed:

- One individual blister should be torn off from the blister card along the perforated line.
- The backing foil should be peeled off and the capsule can be removed.
- The hard capsules should not be pushed through the blister foil.
- The blister foil should only be peeled off, when a hard capsule is required.

When taking a hard capsule out of the bottle, the following instructions should be observed:

- The cap opens by pushing and turning.
- After taking the capsule out, the cap should be returned on the bottle right away and the bottle should be tightly closed.

#### **7. MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

#### **8. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/001  
EU/1/08/442/002  
EU/1/08/442/003  
EU/1/08/442/004  
EU/1/08/442/017

#### **9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

Date of first authorisation: 18 March 2008  
Date of the latest renewal: 17 January 2013

#### **10. DATE OF REVISION OF THE TEXT**

Detailed information on this medicinal product is available on the website of the European Medicines Agency <http://www.ema.europa.eu/>.

## 1. NAME OF THE MEDICINAL PRODUCT

Pradaxa 110 mg hard capsules

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each hard capsule contains 110 mg of dabigatran etexilate (as mesilate).

For the full list of excipients, see section 6.1.

## 3. PHARMACEUTICAL FORM

Hard capsule

Capsules with light blue, opaque cap and light blue, opaque body of size 1 filled with yellowish pellets. The cap is imprinted with the Boehringer Ingelheim company symbol, the body with "R110".

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Primary prevention of venous thromboembolic events in adult patients who have undergone elective total hip replacement surgery or total knee replacement surgery.

Prevention of stroke and systemic embolism in adult patients with non-valvular atrial fibrillation (NVAF), with one or more risk factors, such as prior stroke or transient ischemic attack (TIA); age  $\geq 75$  years; heart failure (NYHA Class  $\geq$  II); diabetes mellitus; hypertension.

Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE), and prevention of recurrent DVT and PE in adults

### 4.2 Posology and method of administration

#### Posology

#### Primary prevention of Venous Thromboembolism in Orthopaedic Surgery (pVTEp orthopaedic surgery)

##### *Patients following elective knee replacement surgery*

The recommended dose of Pradaxa is 220 mg once daily taken as 2 capsules of 110 mg. Treatment should be initiated orally within 1-4 hours of completed surgery with a single capsule of 110 mg and continuing with 2 capsules once daily thereafter for a total of 10 days.

##### *Patients following elective hip replacement surgery*

The recommended dose of Pradaxa is 220 mg once daily taken as 2 capsules of 110 mg. Treatment should be initiated orally within 1-4 hours of completed surgery with a single capsule of 110 mg and continuing with 2 capsules once daily thereafter for a total of 28-35 days.

For the following groups the recommended daily dose of Pradaxa is 150 mg taken once daily as 2 capsules of 75 mg.



Treatment should be initiated orally within 1-4 hours of completed surgery with a single capsule of 75 mg and continuing with 2 capsules once daily thereafter for a total of 10 days (knee replacement surgery) or 28-35 days (hip replacement surgery):

- Patients with moderate renal impairment (creatinine clearance (CrCL) 30-50 mL/min) [see Renal impairment (*pVTEp orthopaedic surgery*)]
- Patients who receive concomitant verapamil, amiodarone, quinidine [see Concomitant use of Pradaxa with mild to moderate P-glycoprotein (P-gp) inhibitors, i.e. amiodarone, quinidine or verapamil (*pVTEp orthopaedic surgery*)]
- Patients aged 75 or above [see Elderly (*pVTEp orthopaedic surgery*)]

For both surgeries, if haemostasis is not secured, initiation of treatment should be delayed. If treatment is not started on the day of surgery then treatment should be initiated with 2 capsules once daily.

Assessment of renal function (*pVTEp orthopaedic surgery*):

In all patients:

- Renal function should be assessed by calculating the creatinine clearance (CrCL) prior to initiation of treatment with Pradaxa to exclude patients with severe renal impairment (i.e. CrCL < 30 mL/min) (see sections 4.3, 4.4 and 5.2). Pradaxa is contraindicated in patients with severe renal impairment
- Renal function should also be assessed when a decline in renal function is suspected during treatment (e.g. hypovolaemia, dehydration, and in case of concomitant use of certain medicinal products)

The method used to estimate renal function (CrCL in mL/min) during the clinical development of Pradaxa was the Cockcroft-Gault method. (see section 4.2 Pradaxa 75 mg)

This method is recommended when assessing patients' CrCL prior to and during Pradaxa treatment.

### Special populations

#### Renal impairment (*pVTEp orthopaedic surgery*)

Treatment with Pradaxa in patients with severe renal impairment (CrCL < 30 mL/min) is contraindicated (see section 4.3).

In patients with moderate renal impairment (CrCL 30-50 mL/min), there is limited clinical experience. These patients should be treated with caution. The recommended dose is 150 mg taken once daily as 2 capsules of 75 mg (see sections 4.4 and 5.1).

#### Concomitant use of Pradaxa with mild to moderate P-glycoprotein (P-gp) inhibitors, i.e. amiodarone, quinidine or verapamil (*pVTEp orthopaedic surgery*)

Dosing should be reduced to 150 mg taken once daily as 2 capsules of 75 mg Pradaxa in patients who receive concomitantly dabigatran etexilate and amiodarone, quinidine or verapamil (see sections 4.4 and 4.5). In this situation Pradaxa and these medicinal products should be taken at the same time.

In patients with moderate renal impairment and concomitantly treated with dabigatran etexilate and verapamil, a dose reduction of Pradaxa to 75 mg daily should be considered (see sections 4.4 and 4.5).

#### Elderly (*pVTEp orthopaedic surgery*)

In elderly patients (> 75 years) there is limited clinical experience. These patients should be treated with caution. The recommended dose is 150 mg taken once daily as 2 capsules of 75 mg (see sections 4.4 and 5.1).

As renal impairment may be frequent in the elderly (>75 years), renal function should be assessed by calculating the CrCL prior to initiation of treatment with Pradaxa to exclude patients with severe renal impairment (i.e. CrCL < 30 mL/min). While on treatment the renal function should also be assessed in certain clinical situations when it is suspected that the renal function could decline or deteriorate (such as hypovolemia, dehydration, and with certain comedications, etc) (see sections 4.3, 4.4 and 5.2).

#### Hepatic impairment (pVTEp orthopaedic surgery)

Patients with elevated liver enzymes > 2 upper limit of normal (ULN) were excluded in clinical trials investigating the VTE prevention following elective hip or knee replacement surgery. No treatment experience is available for this subpopulation of patients, and therefore the use of Pradaxa is not recommended in this population (see sections 4.4 and 5.2). Hepatic impairment or liver disease expected to have any impact on survival is contraindicated (see section 4.3).

#### Weight (pVTEp orthopaedic surgery)

There is very limited clinical experience in patients with a body weight < 50 kg or > 110 kg at the recommended posology. Given the available clinical and kinetic data no adjustment is necessary (see section 5.2), but close clinical surveillance is recommended (see section 4.4).

#### Gender (pVTEp orthopaedic surgery)

Given the available clinical and kinetic data, no dose adjustment is necessary (see section 5.2).

#### Switching (pVTEp orthopaedic surgery)

##### *Pradaxa treatment to parenteral anticoagulant*

It is recommended to wait 24 hours after the last dose before switching from Pradaxa to a parenteral anticoagulant (see section 4.5).

##### *Parenteral anticoagulants to Pradaxa*

Discontinue the parenteral anticoagulant and start dabigatran etexilate 0-2 hours prior to the time that the next dose of the alternate therapy would be due, or at the time of discontinuation in case of continuous treatment (e.g. intravenous Unfractionated Heparin (UFH)) (see section 4.5).

#### Paediatric population (-pVTEp orthopaedic surgery)

There is no relevant use of Pradaxa in the paediatric population for the indication of primary prevention of venous thromboembolic events in patients who have undergone elective total hip replacement surgery or total knee replacement surgery.

#### Missed dose (pVTEp orthopaedic surgery)

It is recommended to continue with the remaining daily doses of dabigatran etexilate at the same time of the next day.

No double dose should be taken to make up for missed individual doses.

## Posology (SPAF, DVT/PE)

### Prevention of stroke and SEE in adult patients with NVAF with one or more risk factors (SPAF)

The recommended daily dose of Pradaxa is 300 mg taken as one 150 mg capsule twice daily. Therapy should be continued long term.

### Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE), and prevention of recurrent DVT, and PE in adults (DVT/PE)

The recommended daily dose of Pradaxa is 300 mg taken as one 150 mg capsule twice daily following treatment with a parenteral anticoagulant for at least 5 days. The duration of therapy should be individualised after careful assessment of the treatment benefit against the risk for bleeding (see section 4.4). Short duration of therapy (at least 3 months) should be based on transient risk factors (e.g. recent surgery, trauma, immobilisation) and longer durations should be based on permanent risk factors or idiopathic DVT or PE.

## SPAF, DVT/PE

For the following groups the recommended daily dose of Pradaxa is 220 mg taken as one 110 mg capsule twice daily:

- Patients aged 80 years or above
- Patients who receive concomitant verapamil

For the following groups the daily dose of Pradaxa of 300 mg or 220 mg should be selected based on an individual assessment of the thromboembolic risk and the risk of bleeding:

- Patients between 75-80 years
- Patients with moderate renal impairment
- Patients with gastritis, esophagitis or gastroesophageal reflux
- Other patients at increased risk of bleeding

For DVT/PE the recommendation for the use of Pradaxa 220 mg taken as one 110 mg capsule twice daily is based on pharmacokinetic and pharmacodynamic analyses and has not been studied in this clinical setting.

See further down and sections 4.4, 4.5, 5.1 and 5.2.

In case of intolerability to dabigatran, patients should be instructed to immediately consult their treating physician in order to be switched to alternate acceptable treatment options for prevention of stroke and SEE associated with atrial fibrillation or for DVT/PE.

### Elderly (SPAF, DVT/PE)

Patients between 75-80 years should be treated with a daily dose of 300 mg taken as one 150 mg capsule twice daily. A dose of 220 mg taken as one 110 mg capsule twice daily can be individually considered, at the discretion of the physician, when the thromboembolic risk is low and the bleeding risk is high (see section 4.4).

Patients aged 80 years or above should be treated with a daily dose of 220 mg taken as one 110 mg capsule twice daily due to the increased risk of bleeding in this population.

As renal impairment may be frequent in the elderly (>75 years), renal function should be assessed by calculating the CrCL prior to initiation of treatment with Pradaxa to exclude patients with severe renal impairment (i.e. CrCL < 30 mL/min). The renal function should also be assessed at least once a year in patients treated with Pradaxa or more frequently as needed in certain clinical situations when it is suspected that the renal function could decline or deteriorate (such as hypovolemia, dehydration, and with certain comedications, etc) (see sections 4.3, 4.4 and 5.2).

### Patients at risk of bleeding (SPAF, DVT/PE)

Patients with an increased bleeding risk (see sections 4.4, 4.5, 5.1 and 5.2) should be closely monitored clinically (looking for signs of bleeding or anaemia). Dose adjustment should be decided at the discretion of the physician, following assessment of the potential benefit and risk to an individual patient. A coagulation test (see section 4.4) may help to identify patients with an increased bleeding risk caused by excessive dabigatran exposure. When excessive dabigatran exposure is identified in patients at high risk of bleeding, a dose of 220 mg taken as one 110 mg capsule twice daily is recommended. When clinically relevant bleeding occurs, treatment should be interrupted.

For subjects with gastritis, esophagitis, or gastroesophageal reflux, the dose of 220 mg taken as one 110 mg capsule twice daily may be considered due to the elevated risk of major gastro-intestinal bleeding (see section 4.4).

Assessment of renal function (SPAF, DVT/PE):

In all patients:

- Renal function should be assessed by calculating the creatinine clearance (CrCL) prior to initiation of treatment with Pradaxa to exclude patients with severe renal impairment (i.e. CrCL < 30 mL/min) (see sections 4.3, 4.4 and 5.2). Pradaxa is contraindicated in patients with severe renal impairment
- Renal function should also be assessed when a decline in renal function is suspected during treatment (e.g. hypovolaemia, dehydration, and in case of concomitant use of certain medicinal products)

Additional requirements in patients with mild to moderate renal impairment and in patients aged over 75 years:

- Renal function should be assessed during treatment with Pradaxa at least once a year or more frequently as needed in certain clinical situations when it is suspected that the renal function could decline or deteriorate (e.g. hypovolaemia, dehydration, and in case of concomitant use of certain medicinal products)

The method used to estimate renal function (CrCL in mL/min) during the clinical development of Pradaxa was the Cockcroft-Gault method (see section 4.2 Pradaxa 75 mg).

### Renal impairment (SPAF, DVT/PE)

Treatment with Pradaxa in patients with severe renal impairment (CrCL < 30 mL/min) is contraindicated (see section 4.3).

No dose adjustment is necessary in patients with mild renal impairment (CrCL 50- ≤ 80 mL/min). For patients with moderate renal impairment (CrCL 30-50 mL/min) the recommended dose of Pradaxa is also 300 mg taken as one 150 mg capsule twice daily. However, for patients with high risk of bleeding, a dose reduction of Pradaxa to 220 mg taken as one 110 mg capsule twice daily should be considered (see sections 4.4 and 5.2). Close clinical surveillance is recommended in patients with renal impairment.

### Concomitant use of Pradaxa with mild to moderate P-glycoprotein (P-gp) inhibitors, i.e. amiodarone, quinidine or verapamil (SPAF, DVT/PE)

No dose adjustment is necessary for concomitant use of amiodarone or quinidine (see sections 4.4, 4.5 and 5.2).

Dosing should be reduced to 220 mg taken as one 110 mg capsule twice daily in SPAF patients who receive concomitantly dabigatran etexilate and verapamil (see sections 4.4 and 4.5). In this situation Pradaxa and verapamil should be taken at the same time.

### Weight (SPAF, DVT/PE)

Given the available clinical and kinetic data, no dose adjustment is necessary (see section 5.2), but close clinical surveillance is recommended in patients with a body weight < 50 kg (see section 4.4).

### Gender (SPAF, DVT/PE)

Given the available clinical and kinetic data, no dose adjustment is necessary (see section 5.2).

### Hepatic impairment (SPAF, DVT/PE)

Patients with elevated liver enzymes > 2 upper limit of normal (ULN) were excluded in the main trials. No treatment experience is available for this subpopulation of patients, and therefore the use of Pradaxa is not recommended in this population (see sections 4.4 and 5.2). Hepatic impairment or liver disease expected to have any impact on survival is contraindicated (see section 4.3).

### Switching (SPAF, DVT/PE)

#### *Pradaxa treatment to parenteral anticoagulant*

It is recommended to wait 12 hours after the last dose before switching from dabigatran etexilate to a parenteral anticoagulant (see section 4.5).

#### *Parenteral anticoagulants to Pradaxa*

Discontinue the parenteral anticoagulant and start dabigatran etexilate 0-2 hours prior to the time that the next dose of the alternate therapy would be due, or at the time of discontinuation in case of continuous treatment (e.g. intravenous Unfractionated Heparin (UFH)) (see section 4.5).

#### *Pradaxa treatment to Vitamin K antagonists (VKA)*

Adjust the starting time of the VKA based on CrCL as follows:

- CrCL  $\geq$  50 mL/min, start VKA 3 days before discontinuing dabigatran etexilate
- CrCL  $\geq$  30- < 50 mL/min, start VKA 2 days before discontinuing dabigatran etexilate

Because Pradaxa can increase INR, the INR will better reflect VKA's effect only after Pradaxa has been stopped for at least 2 days. Until then, INR values should be interpreted with caution.

#### *VKA to Pradaxa*

The VKA should be stopped. Dabigatran etexilate can be given as soon as the International Normalized Ratio (INR) is < 2.0.

### Cardioversion (SPAF, DVT/PE)

Patients can stay on dabigatran etexilate while being cardioverted.

### Paediatric population (SPAF)

There is no relevant use of Pradaxa in the paediatric population for the indication of prevention of stroke and systemic embolism in patients with NVAf.

### Paediatric population (DVT/PE)

The safety and efficacy of Pradaxa in children from birth to less than 18 years of age have not yet been established. Currently available data are described in section 4.8 and 5.1, but no recommendation on a posology can be made.

### Missed dose (SPAF, DVT/PE)

A forgotten dabigatran etexilate dose may still be taken up to 6 hours prior to the next scheduled dose. From 6 hours prior to the next scheduled dose on, the missed dose should be omitted.

No double dose should be taken to make up for missed individual doses.

### Method of administration ( pVTEp orthopaedic surgery , SPAF, DVT/PE)

Pradaxa can be taken with or without food. Pradaxa should be swallowed as a whole with a glass of water, to facilitate delivery to the stomach.

Patients should be instructed not to open the capsule as this may increase the risk of bleeding (see sections 5.2 and 6.6).

## **4.3 Contraindications**

- Hypersensitivity to the active substance or to any of the excipients listed in section 6.1
- Patients with severe renal impairment (CrCL < 30 mL/min) (see section 4.2)
- Active clinically significant bleeding
- Lesion or condition, if considered a significant risk factor for major bleeding. This may include current or recent gastrointestinal ulceration, presence of malignant neoplasms at high risk of bleeding, recent brain or spinal injury, recent brain, spinal or ophthalmic surgery, recent intracranial haemorrhage, known or suspected oesophageal varices, arteriovenous malformations, vascular aneurysms or major intraspinal or intracerebral vascular abnormalities
- Concomitant treatment with any other anticoagulants e.g. unfractionated heparin (UFH), low molecular weight heparins (enoxaparin, dalteparin etc), heparin derivatives (fondaparinux etc), oral anticoagulants (warfarin, rivaroxaban, apixaban etc) except under specific circumstances of switching anticoagulant therapy (see section 4.2) or when UFH is given at doses necessary to maintain an open central venous or arterial catheter (see section 4.5)
- Hepatic impairment or liver disease expected to have any impact on survival
- Concomitant treatment with systemic ketoconazole, cyclosporine, itraconazole and dronedarone (see section 4.5)
- Prosthetic heart valves requiring anticoagulant treatment (see section 5.1).

## **4.4 Special warnings and precautions for use**

### Hepatic impairment

Patients with elevated liver enzymes > 2 ULN were excluded in the main trials. No treatment experience is available for this subpopulation of patients, and therefore the use of Pradaxa is not recommended in this population.

### Haemorrhagic risk

Dabigatran etexilate should be used with caution in conditions with an increased risk of bleeding and in situations with concomitant use of drugs affecting haemostasis by inhibition of platelet aggregation. Bleeding can occur at any site during therapy with dabigatran etexilate. An unexplained fall in haemoglobin and/or haematocrit or blood pressure should lead to a search for a bleeding site.

For situations of life-threatening or uncontrolled bleeding, when rapid reversal of the anticoagulation effect of dabigatran is required, the specific reversal agent (Praxbind, iduarcizumab) is available (see section 4.9).

Factors, such as decreased renal function (30-50 mL/min CrCL), age  $\geq$  75 years, low body weight < 50 kg, or mild to moderate P-gp inhibitor co-medication (e.g. amiodarone, quinidine or verapamil) are associated with increased dabigatran plasma levels (see sections 4.2, 4.5 and 5.2).

The concomitant use of ticagrelor increases the exposure to dabigatran and may show pharmacodynamic interaction, which may result in an increased risk of bleeding (see section 4.5).

In a study of prevention of stroke and SEE in adult patients with NVAf, dabigatran etexilate was associated with higher rates of major gastrointestinal (GI) bleeding which was statistically significant for dabigatran etexilate 150 mg twice daily. This increased risk was seen in the elderly ( $\geq 75$  years). Use of acetylsalicylic acid (ASA), clopidogrel or non steroidal antiinflammatory drug (NSAID), as well as the presence of esophagitis, gastritis or gastroesophageal reflux increase the risk of GI bleeding. In these atrial fibrillation patients a dosage of 220 mg dabigatran given as 110 mg capsule twice daily should be considered and posology recommendations in section 4.2 be followed. The administration of a PPI can be considered to prevent GI bleeding.

Bleeding risk may be increased in patients concomitantly treated with selective serotonin re-uptake inhibitors (SSRIs) or selective serotonin norepinephrine re-uptake inhibitors (SNRIs) (see section 4.5).

Close clinical surveillance (looking for signs of bleeding or anaemia) is recommended throughout the treatment period, especially if risk factors are combined (see section 5.1).

Table 1 summarises factors which may increase the haemorrhagic risk. Please also refer to contraindications in section 4.3.

Table 1: Factors which may increase the haemorrhagic risk.

Pharmacodynamic and kinetic factors	Age $\geq 75$ years
Factors increasing dabigatran plasma levels	<p><u>Major:</u></p> <ul style="list-style-type: none"> <li>• Moderate renal impairment (30-50 mL/min CrCL)</li> <li>• P-gp inhibitor co-medication (some P-gp inhibitors are contraindicated, see section 4.3 and 4.5)</li> </ul> <p><u>Minor:</u></p> <ul style="list-style-type: none"> <li>• Low body weight (&lt; 50 kg)</li> </ul>
Pharmacodynamic interactions	<ul style="list-style-type: none"> <li>• ASA</li> <li>• NSAID</li> <li>• Clopidogrel</li> <li>• SSRIs or SNRIs</li> <li>• Other drugs which may impair haemostasis</li> </ul>
Diseases / procedures with special haemorrhagic risks	<ul style="list-style-type: none"> <li>• Congenital or acquired coagulation disorders</li> <li>• Thrombocytopenia or functional platelet defects</li> <li>• Recent biopsy, major trauma</li> <li>• Bacterial endocarditis</li> <li>• Esophagitis, gastritis and gastroesophageal reflux</li> </ul>

The presence of lesions, conditions, procedures and/or pharmacological treatment (such as NSAIDs, antiplatelets, SSRIs and SNRIs, see section 4.5), which significantly increase the risk of major bleeding requires a careful benefit-risk assessment. Pradaxa should only be given if the benefit outweighs bleeding risks.

Pradaxa does not in general require routine anticoagulant monitoring. However, the measurement of dabigatran related anticoagulation may be helpful to avoid excessive high exposure to dabigatran in

the presence of additional risk factors. The INR test is unreliable in patients on Pradaxa and false positive INR elevations have been reported. Therefore INR tests should not be performed. Diluted thrombin time (dTT), ecarin clotting time (ECT) and activated partial thromboplastin time (aPTT) may provide useful information, but the tests are not standardised, and results should be interpreted with caution (see section 5.1).

Table 2 shows coagulation test thresholds at trough that may be associated with an increased risk of bleeding (see section 5.1)

Table 2: Coagulation test thresholds at trough that may be associated with an increased risk of bleeding.

Test (trough value)	Indication	
		pVTEp orthopaedic surgery
dTT [ng/mL]	> 67	> 200
ECT [x-fold upper limit of normal]	No data	> 3
aPTT [x-fold upper limit of normal]	> 1.3	> 2
INR	Should not be performed	Should not be performed

Patients who develop acute renal failure must discontinue Pradaxa (see section 4.3).

Limited data is available in patients < 50 kg (see section 5.2).

When severe bleedings occur treatment must be discontinued and the source of bleeding investigated (see section 4.9).

Medicinal products that may enhance the risk of haemorrhage should not be administered concomitantly or should be administered with caution with Pradaxa (see section 4.5).

#### Use of fibrinolytic medicinal products for the treatment of acute ischemic stroke

The use of fibrinolytic medicinal products for the treatment of acute ischemic stroke may be considered if the patient presents with a dTT, ECT or aPTT not exceeding the ULN according to the local reference range.

#### Interaction with P-gp inducers

Concomitant administration of P-gp inducers (such as rifampicin, St. John`s wort (*Hypericum perforatum*), carbamazepine, or phenytoin) is expected to result in decreased dabigatran plasma concentrations, and should be avoided (see sections 4.5 and 5.2).

#### Surgery and interventions

Patients on dabigatran etexilate who undergo surgery or invasive procedures are at increased risk for bleeding. Therefore surgical interventions may require the temporary discontinuation of dabigatran etexilate.

Caution should be exercised when treatment is temporarily discontinued for interventions and anticoagulant monitoring is warranted. Clearance of dabigatran in patients with renal insufficiency may take longer (see section 5.2). This should be considered in advance of any procedures. In such cases a coagulation test (see sections 4.4 and 5.1) may help to determine whether haemostasis is still impaired.



### *Emergency surgery or urgent procedures*

Dabigatran etexilate should be temporarily discontinued. When rapid reversal of the anticoagulation effect is required the specific reversal agent (Praxbind, idarucizumab) to Pradaxa is available.

Reversing dabigatran therapy exposes patients to the thrombotic risk of their underlying disease. Pradaxa treatment can be re-initiated 24 hours after administration of Praxbind (idarucizumab), if the patient is clinically stable and adequate haemostasis has been achieved.

### *Subacute surgery/interventions*

Dabigatran etexilate should be temporarily discontinued. A surgery / intervention should be delayed if possible until at least 12 hours after the last dose. If surgery cannot be delayed the risk of bleeding may be increased. This risk of bleeding should be weighed against the urgency of intervention (for cardioversion see section 4.2).

### *Elective surgery*

If possible, Pradaxa should be discontinued at least 24 hours before invasive or surgical procedures. In patients at higher risk of bleeding or in major surgery where complete haemostasis may be required consider stopping Pradaxa 2-4 days before surgery. Clearance of dabigatran in patients with renal insufficiency may take longer. This should be considered in advance of any procedures.

Table 3 summarises discontinuation rules before invasive or surgical procedures.

Table 3: Discontinuation rules before invasive or surgical procedures

Renal function (CrCL in mL/min)	Estimated half-life (hours)	Stop dabigatran before elective surgery	
		High risk of bleeding or major surgery	Standard risk
≥ 80	~ 13	2 days before	24 hours before
≥ 50-< 80	~ 15	2-3 days before	1-2 days before
≥ 30-< 50	~ 18	4 days before	2-3 days before (> 48 hours)

### *Spinal anaesthesia/epidural anaesthesia/lumbar puncture*

Procedures such as spinal anaesthesia may require complete haemostatic function.

The risk of spinal or epidural haematoma may be increased in cases of traumatic or repeated puncture and by the prolonged use of epidural catheters. After removal of a catheter, an interval of at least 2 hours should elapse before the administration of the first dose of dabigatran etexilate. These patients require frequent observation for neurological signs and symptoms of spinal or epidural haematoma.

### *Postoperative phase*

Dabigatran etexilate should be restarted after the invasive procedure or surgical intervention as soon as possible provided the clinical situation allows and adequate haemostasis has been established.

Patients at risk for bleeding or patients at risk of overexposure, notably patients with moderate renal impairment (CrCL 30-50 mL/min), should be treated with caution (see sections 4.4 and 5.1).

### Patients at high surgical mortality risk and with intrinsic risk factors for thromboembolic events

There are limited efficacy and safety data for dabigatran available in these patients and therefore they should be treated with caution.

### Hip fracture surgery

There is no data on the use of Pradaxa in patients undergoing hip fracture surgery. Therefore treatment is not recommended.

### Myocardial Infarction (SPAF)

In the phase III study RE-LY (see section 5.1.) the overall rate of myocardial infarction (MI) was 0.82, 0.81, and 0.64 % / year for dabigatran etexilate 110 mg twice daily, dabigatran etexilate 150 mg twice daily and warfarin, respectively, an increase in relative risk for dabigatran of 29 % and 27 % compared to warfarin. Irrespective of therapy, the highest absolute risk of MI was seen in the following subgroups, with similar relative risk: patients with previous MI, patients  $\geq 65$  years with either diabetes or coronary artery disease, patients with left ventricular ejection fraction  $< 40$  %, and patients with moderate renal dysfunction. Furthermore a higher risk of MI was seen in patients concomitantly taking ASA plus clopidogrel or clopidogrel alone.

### Myocardial Infarction (DVT/PE)

In the three active controlled studies, a higher rate of MI was reported in patients who received dabigatran etexilate than in those who received warfarin: 0.4% vs. 0.2% in the short-term RE-COVER and RE-COVER II studies; and 0.8% vs. 0.1% in the long-term RE-MEDY trial. The increase was statistically significant in this study ( $p=0.022$ ).

In the RE-SONATE study, which compared dabigatran etexilate to placebo, the rate of MI was 0.1% for patients who received dabigatran etexilate and 0.2% for patients who received placebo

### Active Cancer Patients (DVT/PE)

The efficacy and safety have not been established for DVT/PE patients with active cancer.

## **4.5 Interaction with other medicinal products and other forms of interaction**

### Anticoagulants and antiplatelet aggregation medicinal products

There is no or only limited experience with the following treatments which may increase the risk of bleeding when used concomitantly with Pradaxa: anticoagulants such as unfractionated heparin (UFH), low molecular weight heparins (LMWH), and heparin derivatives (fondaparinux, desirudin), thrombolytic medicinal products, and vitamin K antagonists, rivaroxaban or other oral anticoagulants (see section 4.3), and platelet aggregation medicinal products such as GPIIb/IIIa receptor antagonists, ticlopidine, prasugrel, ticagrelor, dextran, and sulfapyrazone (see section 4.4).

From the limited data collected in the phase III study RE LY in patients with atrial fibrillation it was observed that the concomitant use of other oral or parenteral anticoagulants increases major bleeding rates with both dabigatran etexilate and warfarin by approximately 2.5-fold, mainly related to situations when switching from one anticoagulant to another (see section 4.3).

UFH can be administered at doses necessary to maintain a patent central venous or arterial catheter (see section 4.3).

Clopidogrel and ASA: From the data collected in the phase III study RE-LY (see section 5.1) it was observed that the concomitant use of antiplatelets, ASA or clopidogrel approximately doubles major bleeding rates with both dabigatran etexilate and warfarin (see section 4.4).

Clopidogrel: In a phase I study in young healthy male volunteers, the concomitant administration of dabigatran etexilate and clopidogrel resulted in no further prolongation of capillary bleeding times compared to clopidogrel monotherapy. In addition, dabigatran  $AUC_{\tau,ss}$  and  $C_{max,ss}$  and the

coagulation measures for dabigatran effect or the inhibition of platelet aggregation as measure of clopidogrel effect remained essentially unchanged comparing combined treatment and the respective mono-treatments. With a loading dose of 300 mg or 600 mg clopidogrel, dabigatran  $AUC_{\tau,ss}$  and  $C_{max,ss}$  were increased by about 30-40 % (see section 4.4) (see also subsection on ASA below).

ASA: The effect of concomitant administration of dabigatran etexilate and ASA on the risk of bleeds was studied in patients with atrial fibrillation in a phase II study in which a randomized ASA co-administration was applied. Based on logistic regression analysis, co-administration of ASA and 150 mg dabigatran etexilate twice daily may increase the risk for any bleeding from 12 % to 18 % and 24 % with 81 mg and 325 mg ASA, respectively (see section 4.4).

NSAIDs: NSAIDs given for short-term perioperative analgesia have been shown not to be associated with increased bleeding risk when given in conjunction with dabigatran etexilate. With chronic use in the RE-LY study, NSAIDs increased the risk of bleeding by approximately 50 % on both dabigatran etexilate and warfarin. Therefore, due to the risk of haemorrhage, notably with NSAIDs with elimination half-lives > 12 hours, close observation for signs of bleeding is recommended (see section 4.4).

LMWH: The concomitant use of LMWHs, such as enoxaparin and dabigatran etexilate has not been specifically investigated. After switching from 3-day treatment of once daily 40 mg enoxaparin s.c., 24 hours after the last dose of enoxaparin the exposure to dabigatran was slightly lower than that after administration of dabigatran etexilate (single dose of 220 mg) alone. A higher anti-FXa/FIIa activity was observed after dabigatran etexilate administration with enoxaparin pre-treatment compared to that after treatment with dabigatran etexilate alone. This is considered to be due to the carry-over effect of enoxaparin treatment, and regarded as not clinically relevant. Other dabigatran related anti-coagulation tests were not changed significantly by the pre-treatment of enoxaparin.

#### Interactions linked to dabigatran etexilate and dabigatran metabolic profile

Dabigatran etexilate and dabigatran are not metabolised by the cytochrome P450 system and have no *in vitro* effects on human cytochrome P450 enzymes. Therefore, related medicinal product interactions are not expected with dabigatran.

#### Transporter interactions

##### *P-gp inhibitors*

Dabigatran etexilate is a substrate for the efflux transporter P-gp. Concomitant administration of P-gp inhibitors (such as amiodarone, verapamil, quinidine, ketoconazole, dronedarone, clarithromycin and ticagrelor) is expected to result in increased dabigatran plasma concentrations.

If not otherwise specifically described, close clinical surveillance (looking for signs of bleeding or anaemia) is required when dabigatran is co-administered with strong P-gp inhibitors. A coagulation test helps to identify patients with an increased bleeding risk due to increased dabigatran exposure (see sections 4.2, 4.4 and 5.1).

The following strong P-gp inhibitors are contraindicated: systemic ketoconazole, cyclosporine, itraconazole and dronedarone (see section 4.3). Concomitant treatment with tacrolimus is not recommended. Caution should be exercised with mild to moderate P-gp inhibitors (e.g. amiodarone, posaconazole, quinidine, verapamil and ticagrelor) (see sections 4.2 and 4.4).

Ketoconazole: Ketoconazole increased total dabigatran  $AUC_{0-\infty}$  and  $C_{max}$  values by 138 % and 135 %, respectively, after a single oral dose of 400 mg, and 153 % and 149 %, respectively, after multiple oral dosing of 400 mg ketoconazole once daily. The time to peak, terminal half-life and mean residence time were not affected by ketoconazole (see section 4.4). Concomitant treatment with systemic ketoconazole is contraindicated (see section 4.3).

**Dronedarone:** When dabigatran etexilate and dronedarone were given at the same time total dabigatran  $AUC_{0-\infty}$  and  $C_{max}$  values increased by about 2.4-fold and 2.3-fold (+136 % and 125 %), respectively, after multiple dosing of 400 mg dronedarone bid, and about 2.1-fold and 1.9-fold (+114 % and 87 %), respectively, after a single dose of 400 mg. The terminal half-life and renal clearance of dabigatran were not affected by dronedarone. When single and multiple doses of dronedarone were given 2 h after dabigatran etexilate, the increases in dabigatran  $AUC_{0-\infty}$  were 1.3-fold and 1.6-fold, respectively. Concomitant treatment with dronedarone is contraindicated.

**Amiodarone:** When Pradaxa was co-administered with a single oral dose of 600 mg amiodarone, the extent and rate of absorption of amiodarone and its active metabolite DEA were essentially unchanged. The dabigatran AUC and  $C_{max}$  were increased by about 60 % and 50 %, respectively. The mechanism of the interaction has not been completely clarified. In view of the long half-life of amiodarone the potential for drug interaction may exist for weeks after discontinuation of amiodarone (see sections 4.2 and 4.4).

Patients treated for prevention of VTEs after hip or knee replacement surgery, dosing should be reduced to 150 mg taken once daily as 2 capsules of 75 mg Pradaxa if they receive concomitantly dabigatran etexilate and amiodarone (see section 4.2). Close clinical surveillance is recommended when dabigatran etexilate is combined with amiodarone and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

**Quinidine:** Quinidine was given as 200 mg dose every 2nd hour up to a total dose of 1,000 mg. Dabigatran etexilate was given twice daily over 3 consecutive days, on the 3<sup>rd</sup> day either with or without quinidine. Dabigatran  $AUC_{\tau,ss}$  and  $C_{max,ss}$  were increased on average by 53 % and 56 %, respectively with concomitant quinidine (see sections 4.2 and 4.4).

Patients treated for prevention of VTEs after hip or knee replacement surgery, dosing should be reduced to 150 mg taken once daily as 2 capsules of 75 mg Pradaxa if they receive concomitantly dabigatran etexilate and quinidine (see section 4.2). Close clinical surveillance is recommended when dabigatran etexilate is combined with quinidine and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

**Verapamil:** When dabigatran etexilate (150 mg) was co-administered with oral verapamil, the  $C_{max}$  and AUC of dabigatran were increased but magnitude of this change differs depending on timing of administration and formulation of verapamil (see sections 4.2 and 4.4).

The greatest elevation of dabigatran exposure was observed with the first dose of an immediate release formulation of verapamil administered one hour prior to dabigatran etexilate intake (increase of  $C_{max}$  by about 180 % and AUC by about 150 %). The effect was progressively decreased with administration of an extended release formulation (increased of  $C_{max}$  by about 90 % and AUC by about 70 %) or administration of multiple doses of verapamil (increased of  $C_{max}$  by about 60 % and AUC by about 50 %).

Therefore, close clinical surveillance (looking for signs of bleeding or anaemia) is required when dabigatran is co-administered with verapamil. In patients with normal renal function after hip or knee replacement surgery, receiving dabigatran etexilate and verapamil concomitantly, the dose of Pradaxa should be reduced to 150 mg taken once daily as 2 capsules of 75 mg. In patients with moderate renal impairment and concomitantly treated with dabigatran etexilate and verapamil, a dose reduction of Pradaxa to 75 mg daily should be considered (see sections 4.2 and 4.4).

For patients with NVAf treated for prevention of stroke and SEE and for DVT/PE patients, concomitantly receiving dabigatran etexilate and verapamil, the dose of Pradaxa should be reduced to 220 mg taken as one 110 mg capsule twice daily (see section 4.2).

Close clinical surveillance is recommended when dabigatran etexilate is combined with verapamil and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

There was no meaningful interaction observed when verapamil was given 2 hours after dabigatran etexilate (increased of  $C_{max}$  by about 10 % and AUC by about 20 %). This is explained by completed dabigatran absorption after 2 hours (see section 4.4).

Clarithromycin: When clarithromycin (500 mg twice daily) was administered together with dabigatran etexilate in healthy volunteers, increase of AUC by about 19 % and  $C_{max}$  by about 15 % was observed without any clinical safety concern. However, in patients receiving dabigatran, a clinically relevant interaction cannot be excluded when combined with clarithromycin. Therefore, a close monitoring should be exercised when dabigatran etexilate is combined with clarithromycin and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

Ticagrelor: When a single dose of 75mg dabigatran etexilate was coadministered simultaneously with a loading dose of 180 mg ticagrelor, the dabigatran AUC and  $C_{max}$  were increased by 1.73-fold and 1.95-fold (+73% and 95 %), respectively. After multipledoses of ticagrelor 90 mg b.i.d. the increase of dabigatran exposure is 1.56-fold and 1.46-fold (+56% and 46%) for  $C_{max}$  and AUC, respectively.

Concomitant administration of a loading dose of 180 mg ticagrelor and 110 mg dabigatran etexilate (in steady state) increased the dabigatran  $AUC_{\tau,ss}$  and  $C_{max,ss}$  by 1.49-fold and 1.65-fold (+49% and 65%), respectively, compared with dabigatran etexilate given alone. When a loading dose of 180 mg ticagrelor was given 2 hours after 110 mg dabigatran etexilate (in steady state), the increase of dabigatran  $AUC_{\tau,ss}$  and  $C_{max,ss}$  was reduced to 1.27-fold and 1.23-fold (+27% and 23%), respectively, compared with dabigatran etexilate given alone. This staggered intake is the recommended administration for start of ticagrelor with a loading dose.

Concomitant administration of 90 mg ticagrelor BID (maintenance dose) with 110 mg dabigatran etexilate increased the adjusted dabigatran  $AUC_{\tau,ss}$  and  $C_{max,ss}$  1.26-fold and 1.29-fold, respectively, compared with dabigatran etexilate given alone.

The following potent P-gp inhibitors have not been clinically studied but from *in vitro* results a similar effect as with ketoconazole may be expected:

Itraconazole and cyclosporine, which are contra-indicated (see section 4.3).

Tacrolimus has been found *in vitro* to have a similar level of inhibitory effect on P-gp as that seen with itraconazole and cyclosporine. Dabigatran etexilate has not been clinically studied together with tacrolimus. However, limited clinical data with another P-gp substrate (everolimus) suggest that the inhibition of P-gp with tacrolimus is weaker than that observed with strong P-gp inhibitors. Based on these data concomitant treatment with tacrolimus is not recommended.

Posaconazole also inhibits P-gp to some extent but has not been clinically studied. Caution should be exercised when Pradaxa is co-administered with posaconazole.

#### P-gp inducers

Concomitant administration of a P-gp inducer (such as rifampicin, St. John's wort (*Hypericum perforatum*), carbamazepine, or phenytoin) is expected to result in decreased dabigatran concentrations and should be avoided (see sections 4.4 and 5.2).

Rifampicin: Pre-dosing of the probe inducer rifampicin at a dose of 600 mg once daily for 7 days decreased total dabigatran peak and total exposure by 65.5 and 67 %, respectively. The inducing effect was diminished resulting in dabigatran exposure close to the reference by day 7 after cessation of rifampicin treatment. No further increase in bioavailability was observed after another 7 days.

### Other medicinal products affecting P-gp

Protease inhibitors including ritonavir and its combinations with other protease inhibitors affect P-gp (either as inhibitor or as inducer). They have not been studied and are therefore not recommended for concomitant treatment with Pradaxa.

### P-gp substrate

Digoxin: In a study performed with 24 healthy subjects, when Pradaxa was co-administered with digoxin, no changes on digoxin and no clinical relevant changes on dabigatran exposure have been observed.

### Co-medication with selective serotonin re-uptake inhibitors (SSRIs) or selective serotonin norepinephrine re-uptake inhibitors (SNRIs)

SSRIs and SNRIs increased the risk of bleeding in RE-LY in all treatment groups.

### Gastric pH

Pantoprazole: When Pradaxa was co-administered with pantoprazole, a decrease in the dabigatran area under the plasma concentration-time curve of approximately 30 % was observed. Pantoprazole and other proton-pump inhibitors (PPI) were co-administered with Pradaxa in clinical trials, and concomitant PPI treatment did not appear to reduce the efficacy of Pradaxa.

Ranitidine: Ranitidine administration together with Pradaxa had no clinically relevant effect on the extent of absorption of dabigatran.

## **4.6 Fertility, pregnancy and lactation**

### Women of childbearing potential / Contraception in males and females

Women of childbearing potential should avoid pregnancy during treatment with dabigatran etexilate.

### Pregnancy

There are limited amount of data from the use of dabigatran etexilate in pregnant women. Studies in animals have shown reproductive toxicity (see section 5.3). The potential risk for humans is unknown.

Pradaxa should not be used during pregnancy unless clearly necessary.

### Breast-feeding

There are no clinical data of the effect of dabigatran on infants during breast-feeding. Breast-feeding should be discontinued during treatment with Pradaxa.

### Fertility

No human data available.

In animal studies an effect on female fertility was observed in the form of a decrease in implantations and an increase in pre-implantation loss at 70 mg/kg (representing a 5-fold higher plasma exposure level compared to patients). No other effects on female fertility were observed. There was no influence on male fertility. At doses that were toxic to the mothers (representing a 5- to 10-fold higher plasma exposure level to patients), a decrease in foetal body weight and embryofoetal viability along with an increase in foetal variations were observed in rats and rabbits. In the pre- and post-natal study, an

increase in foetal mortality was observed at doses that were toxic to the dams (a dose corresponding to a plasma exposure level 4-fold higher than observed in patients).

#### **4.7 Effects on ability to drive and use machines**

Pradaxa has no or negligible influence on the ability to drive and use machines.

#### **4.8 Undesirable effects**

##### Summary of the safety profile

A total of 10,795 patients were treated in 6 actively controlled VTE prevention trials with at least one dose of the medicinal product. Of these 6,684 were treated with 150 mg or 220 mg daily of Pradaxa.

In the pivotal study investigating the prevention of stroke and SEE in patients with atrial fibrillation, a total of 12,042 patients were treated with dabigatran etexilate. Of these 6,059 were treated with 150 mg twice daily of dabigatran etexilate, while 5,983 received doses of 110 mg twice daily.

In the 2 active controlled a DVT/PE treatment trials, RE-COVER and RE-COVER II, a total of 2,553 patients were included in the safety analysis for dabigatran etexilate. All patients received doses of 150 mg twice daily of dabigatran etexilate. Adverse drug reactions for both treatments, dabigatran etexilate and warfarin, are counted from the first intake of dabigatran etexilate or warfarin after the parenteral therapy has been discontinued (oral only treatment period). This includes all adverse drug reactions which occurred during dabigatran therapy. All adverse drug reactions, which occurred during warfarin therapy, are included except for those during the overlap period between warfarin and parenteral therapy.

A total of 2,114 patients were treated in the active controlled DVT/PE prevention trial, RE-MEDY, and in the placebo-controlled DVT/PE prevention trial, RE-SONATE. All patients received doses of 150 mg twice daily of dabigatran etexilate.

In total, about 9 % of patients treated for elective hip or knee surgery (short-term treatment for up to 42 days) , 22 % of patient with atrial fibrillation treated for the prevention of stroke and SEE (long-term treatment for up to 3 years), 14 % of patient treated for DVT/PE and 15 % of patients treated for DVT/PE prevention experienced adverse reactions.

The most commonly reported adverse reactions are bleedings occurring in total in approximately 14 % of patients treated short-term for elective hip or knee replacement surgery, 16,6 % in patients with atrial fibrillation treated long-term for the prevention of stroke and SEE, and in 14,4 % of patients treated for DVT/PE. Furthermore, bleeding occurred in 19,4% of patients in the DVT/PE prevention trial RE-MEDY and in 10,5% of patient in the DVT/PE prevention trial RE-SONATE.

Since the patient populations treated in the three indications are not comparable and bleeding events are distributed over several System Organ Classes (SOC), a summary description of major and any bleeding are broken down by indication and given in tables 5 and 6 below.

Although low in frequency in clinical trials, major or severe bleeding may occur and, regardless of location, may lead to disabling, life-threatening or even fatal outcomes.

##### Tabulated list of adverse reactions

Table 4 shows the adverse reactions identified from the primary VTE prevention studies after hip or knee replacement surgery, the study in the prevention of thromboembolic stroke , and SEE in patients with atrial fibrillation and the studies in DVT/PE treatment and- in-DVT/PE prevention. They are ranked under headings of SOC and frequency using the following convention: very common ( $\geq 1/10$ ), common ( $\geq 1/100$  to  $<1/10$ ), uncommon ( $\geq 1/1,000$  to  $<1/100$ ), rare ( $\geq 1/10,000$  to  $<1/1,000$ ), very rare ( $<1/10,000$ ), not known (cannot be estimated from the available data).

Table 4: Adverse reactions

SOC / Preferred term.	Primary VTE prevention after hip or knee replacement surgery	Stroke and SEE prevention in patients with atrial fibrillation	DVT/PE treatment and DVT/PE prevention
Blood and lymphatic system disorders			
Anaemia	Uncommon	Common	Uncommon
Haemoglobin decreased	Common	Uncommon	Not known
Thrombocytopenia	Rare	Uncommon	Rare
Haematocrit decreased	Uncommon	Rare	Not known
Immune system disorder			
Drug hypersensitivity	Uncommon	Uncommon	Uncommon
Rash	Rare	Uncommon	Uncommon
Pruritus	Rare	Uncommon	Uncommon
Anaphylactic reaction	Rare	Rare	Rare
Angioedema	Rare	Rare	Rare
Urticaria	Rare	Rare	Rare
Bronchospasm	Not known	Not known	Not known
Nervous system disorders			
Intracranial haemorrhage	Rare	Uncommon	Rare
Vascular disorders			
Haematoma	Uncommon	Uncommon	Uncommon
Haemorrhage	Rare	Uncommon	Uncommon
Wound haemorrhage	Uncommon	-	
Respiratory, thoracic and mediastinal disorders			
Epistaxis	Uncommon	Common	Common
Haemoptysis	Rare	Uncommon	Uncommon
Gastrointestinal disorders			
Gastrointestinal haemorrhage	Uncommon	Common	Common
Abdominal pain	Rare	Common	Uncommon
Diarrhoea	Uncommon	Common	Uncommon
Dyspepsia	Rare	Common	Common
Nausea	Uncommon	Common	Uncommon
Rectal haemorrhage	Uncommon	Uncommon	Common
Haemorrhoidal haemorrhage	Uncommon	Uncommon	Uncommon
Gastrointestinal ulcer, including oesophageal ulcer	Rare	Uncommon	Uncommon
Gastroesophagitis	Rare	Uncommon	Uncommon
Gastroesophageal reflux disease	Rare	Uncommon	Uncommon
Vomiting	Uncommon	Uncommon	Uncommon
Dysphagia	Rare	Uncommon	Rare
Hepatobiliary disorders			
Hepatic function abnormal/ Liver function Test abnormal	Common	Uncommon	Uncommon
Alanine aminotransferase increased	Uncommon	Uncommon	Uncommon
Aspartate aminotransferase increased	Uncommon	Uncommon	Uncommon
Hepatic enzyme increased	Uncommon	Rare	Uncommon
Hyperbilirubinaemia	Uncommon	Rare	Not known



Skin and subcutaneous tissue disorder			
Skin haemorrhage	Uncommon	Common	Common
Musculoskeletal and connective tissue disorders			
Haemarthrosis	Uncommon	Rare	Uncommon
Renal and urinary disorders			
Genitourological haemorrhage, including haematuria	Uncommon	Common	Common
General disorders and administration site conditions			
Injection site haemorrhage	Rare	Rare	Rare
Catheter site haemorrhage	Rare	Rare	Rare
Bloody discharge	Rare	-	
Injury, poisoning and procedural complications			
Traumatic haemorrhage	Uncommon	Rare	Uncommon
Incision site haemorrhage	Rare	Rare	Rare
Post procedural haematoma	Uncommon	-	-
Post procedural haemorrhage	Uncommon	-	
Anaemia postoperative	Rare	-	-
Post procedural discharge	Uncommon	-	-
Wound secretion	Uncommon	-	-
Surgical and medical procedures			
Wound drainage	Rare	-	-
Post procedural drainage	Rare	-	.

Primary Prevention of Venous Thromboembolism in Orthopaedic Surgery (pVTEp orthopaedic surgery)

Bleeding

The table 5 shows the number (%) of patients experiencing the adverse reaction bleeding during the treatment period in the VTE prevention in the two pivotal clinical trials, according to dose.

Table 5: Number (%) of patients experiencing the adverse reaction bleeding

	Dabigatran etexilate 150 mg once daily N (%)	Dabigatran etexilate 220 mg once daily N (%)	Enoxaparin N (%)
Treated	1,866 (100.0)	1,825 (100.0)	1,848 (100.0)
Major bleeding	24 (1.3)	33 (1.8)	27 (1.5)
Any bleeding	258 (13.8)	251 (13.8)	247 (13.4)

The definition of the adverse reaction major bleeding in the RE-NOVATE and RE-MODEL studies were as follows:

- fatal bleeding
- clinically overt bleeding in excess of what was expected and associated with  $\geq 20$  g/L (corresponds to 1.24 mmol/L) fall in haemoglobin in excess of what was expected
- clinically overt bleeding in excess of what was expected and leading to transfusion of  $\geq 2$  units packed cells or whole blood in excess of what was expected
- symptomatic retroperitoneal, intracranial, intraocular or intraspinal bleeding
- bleeding requiring treatment cessation
- bleeding leading to re-operation

Objective testing was required for a retroperitoneal bleed (ultrasound or Computer Tomography (CT) scan) and for an intracranial and intraspinal bleed (CT scan or Magnetic Resonance Imaging).

## Prevention of stroke and SEE in adult patients with NVAf with one or more risk factors

### Bleeding

The table 6 shows bleeding events broken down to major and any bleeding in the pivotal study testing the prevention of thromboembolic stroke and SEE in patients with atrial fibrillation.

Table 6: Bleeding events in a study testing the prevention of thromboembolic stroke and SEE in patients with atrial fibrillation

	Dabigatran etexilate 110 mg twice daily	Dabigatran etexilate 150 mg twice daily	Warfarin
Subjects randomized	6,015	6,076	6,022
Major bleeding	347 (2.92 %)	409 (3.40 %)	426 (3.61 %)
Intracranial bleeding	27 (0.23 %)	39 (0.32 %)	91 (0.77 %)
GI bleeding	134 (1.13 %)	192 (1.60 %)	128 (1.09 %)
Fatal bleeding	26 (0.22 %)	30 (0.25 %)	42 (0.36 %)
Minor bleeding	1,566 (13.16 %)	1,787 (14.85 %)	1,931 (16.37 %)
Any bleeding	1,759 (14.78 %)	1,997 (16.60 %)	2,169 (18.39 %)

Major bleeding was defined to fulfil one or more of the following criteria:

Bleeding associated with a reduction in haemoglobin of at least 20 g/L or leading to a transfusion of at least 2 units of blood or packed cells.

Symptomatic bleeding in a critical area or organ: intraocular, intracranial, intraspinal or intramuscular with compartment syndrome, retroperitoneal bleeding, intra-articular bleeding or pericardial bleeding.

Major bleeds were classified as life-threatening if they fulfilled one or more of the following criteria:

Fatal bleed; symptomatic intracranial bleed; reduction in haemoglobin of at least 50 g/L; transfusion of at least 4 units of blood or packed cells; a bleed associated with hypotension requiring the use of intravenous inotropic medicinal products; a bleed that necessitated surgical intervention.

Subjects randomized to dabigatran etexilate 110 mg twice daily or 150 mg twice daily had a significantly lower risk for life-threatening bleeds and intracranial bleeding compared to warfarin [ $p < 0.05$ ]. Both dose strengths of dabigatran etexilate had also a statistically significant lower total bleed rate. Subjects randomized to dabigatran etexilate 110 mg twice daily had a significantly lower risk for major bleeds compared with warfarin (hazard ratio 0.81 [ $p=0.0027$ ]). Subjects randomized to dabigatran etexilate 150 mg twice daily had a significantly higher risk for major GI bleeds compared with warfarin (hazard ratio 1.48 [ $p=0.0005$ ]). This effect was seen primarily in patients  $\geq 75$  years. The clinical benefit of dabigatran with regard to stroke and SEE prevention and decreased risk of ICH compared to warfarin is preserved across individual subgroups, e.g. renal impairment, age, concomitant medication use such as anti-platelets or P-gp inhibitors. While certain patient subgroups are at an increased risk of major bleeding when treated with an anticoagulant, the excess bleeding risk for dabigatran is due to GI bleeding, typically seen within the first 3-6 months following initiation of dabigatran etexilate therapy.

### Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE), and prevention of recurrent DVT and PE in adults (DVT/PE treatment)

Table 7 shows bleeding events in the pooled pivotal studies RE-COVER and RE-COVER II testing the treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE). In the pooled studies the primary safety endpoints of major bleeding, major or clinically relevant bleeding and any bleeding were significantly lower than warfarin at a nominal alpha level of 5 %.

Table 7: Bleeding events in the studies RE-COVER and RE-COVER II testing the treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE)

	Dabigatran etexilate 150 mg twice daily	Warfarin	Hazard ratio vs. warfarin (95% confidence interval)
Patients included in safety analysis	2,456	2,462	
Major bleeding events	24 (1.0 %)	40 (1.6 %)	0.60 (0.36, 0.99)
Intracranial Bleeding	2 (0.1 %)	4 (0.2 %)	0.50 (0.09, 2.74)
Major GI bleeding	10 (0.4 %)	12 (0.5 %)	0.83 (0.36, 1.93)
Life-threatening bleed	4 (0.2 %)	6 (0.2 %)	0.66 (0.19, 2.36)
Major bleeding events/clinically relevant bleeds	109 (4.4 %)	189 (7.7 %)	0.56 (0.45, 0.71)
Any bleeding	354 (14.4 %)	503 (20.4 %)	0.67 (0.59, 0.77)
Any GI bleeding	70 (2.9 %)	55 (2.2 %)	1.27 (0.90, 1.82)

Bleeding events for both treatments are counted from the first intake of dabigatran etexilate or warfarin after the parenteral therapy has been discontinued (oral only treatment period). This includes all bleeding events, which occurred during dabigatran etexilate therapy. All bleeding events which occurred during warfarin therapy are included except for those during the overlap period between warfarin and parenteral therapy.

The definition of major bleeding events (MBEs) followed the recommendations of the International Society on Thrombosis and Haemostasis. A bleeding event was categorised as an MBE if it fulfilled at least one of the following criteria:

- Fatal bleeding
- Symptomatic bleeding in a critical area or organ, such as intracranial, intraspinal, intraocular, retroperitoneal, intra-articular, or pericardial, or intramuscular with compartment syndrome. In order for bleeding in a critical area or organ to be classified as a MBE it had to be associated with a symptomatic clinical presentation
- Bleeding causing a fall in haemoglobin level of 20 g/L (1.24 mmol/L) or more, or leading to transfusion of 2 or more units of whole blood or red cells

Table 8 shows bleeding events in pivotal study RE-MEDY testing prevention of deep vein thrombosis (DVT) and pulmonary embolism (PE). Some bleeding events (MBEs/CRBEs; any bleeding) were significantly lower at a nominal alpha level of 5% in patients receiving dabigatran etexilate as compared with those receiving warfarin.

Table 8: Bleeding events in study RE-MEDY testing prevention of deep vein thrombosis (DVT) and pulmonary embolism (PE)

	Dabigatran etexilate 150 mg twice daily	Warfarin	Hazard ratio vs warfarin (95% Confidence Interval)
Treated patients	1,430	1,426	
Major bleeding events	13 (0.9 %)	25 (1.8 %)	0.54 (0.25, 1.16)
Intracranial bleeding	2 (0.1 %)	4 (0.3 %)	Not calculable*
Major GI bleeding	4 (0.3%)	8 (0.5%)	Not calculable*
Life-threatening bleed	1 (0.1 %)	3 (0.2 %))	Not calculable*
Major bleeding event /clinically relevant bleeds	80 (5.6 %)	145 (10.2 %)	0.55 ( 0.41, 0.72)
Any bleeding	278 (19.4 %)	373 (26.2 %)	0.71 (0.61, 0.83)
Any GI bleeds	45 (3.1%)	32 (2.2%)	1.39 (0.87, 2.20)

\*HR not estimable as there is no event in either one cohort/treatment

The definition of MBEs followed the recommendations of the International Society on Thrombosis and Haemostasis as described under RE-COVER and RE-COVER II.

Table 9 shows bleeding events in pivotal study RE-SONATE testing prevention of deep vein thrombosis (DVT) and pulmonary embolism (PE). The rate of the combination of MBEs/CRBEs and the rate of any bleeding was significantly lower at a nominal alpha level of 5 % in patients receiving placebo as compared with those receiving dabigatran etexilate.

Table 9: Bleeding events in study RE-SONATE testing prevention of deep vein thrombosis (DVT) and pulmonary embolism (PE)

	Dabigatran etexilate 150 mg twice daily	Placebo	Hazard ratio vs placebo (95% confidence interval)
Treated patients	684	659	
Major bleeding events	(0.3 %)	0	Not calculable*
Intracranial bleeding	0	0	Not calculable*
Major GI bleeding	2 (0.3%)	0	Not calculable*
Life-threatening bleeds	0	0	Not calculable*
Major bleeding event/clinical relevant bleeds	36 (5.3 %)	13 (2.0 %)	2.69 (1.43, 5.07)
Any bleeding	72 (10.5 %)	40 (6.1 %)	1.77 (1.20, 2.61)
Any GI bleeds	5 (0.7%)	2 (0.3%)	2.38 (0.46, 12.27)

\*HR not estimable as there is no event in either one treatment

The definition of MBEs followed the recommendations of the International Society on Thrombosis and Haemostasis as described under RE-COVER and RE-COVER II.

## Myocardial infarction

### Prevention of stroke and SEE in adult patients with nonvalvular atrial fibrillation with one or more risk factors (SPAF)

In the RE-LY study, in comparison to warfarin the annual myocardial infarction rate for dabigatran etexilate was increased from 0.64 % (warfarin) to 0.82 % (dabigatran etexilate 110 mg twice daily) / 0.81 % (dabigatran etexilate 150 mg twice daily) (see section 5.1).

Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE), and prevention of recurrent DVT and PE in adults (DVT/PE)

In the three active controlled studies, a higher rate of MI was reported in patients who received dabigatran etexilate than in those who received warfarin: 0.4% vs. 0.2% in the short-term RE-COVER and RE-COVER II studies; and 0.8 % vs. 0.1% in the long-term RE-MEDY trial. The increase was statistically significant in this study (p=0.022).

In the RE-SONATE study, which compared dabigatran etexilate to placebo, the rate of MI was 0.1% for patients who received dabigatran etexilate and 0.2 % for patients who received placebo (see section 4.4).

### Paediatric population (DVT/PE)

In the clinical study 1160.88 in total, 9 adolescent patients (age 12 to < 18 years) with diagnosis of primary VTE received an initial oral dose of dabigatran etexilate of 1.71 ( $\pm$  10 %) mg/kg bodyweight. Based on dabigatran concentrations as determined by the diluted thrombin time test and clinical assessment, the dose was adjusted to the target dose of 2.14 ( $\pm$  10%) mg/kg bodyweight of dabigatran etexilate. On treatment 2 (22.1 %) patients experienced mild related adverse events (gastroesophageal reflux / abdominal pain; abdominal discomfort) and 1 (11.1 %) patient experienced a not related serious adverse event (recurrent VTE of the leg) in the post treatment period > 3 days after stop of dabigatran etexilate.

### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via [the national reporting system listed in Appendix V](#).

## **4.9 Overdose**

Doses of dabigatran etexilate beyond those recommended, expose the patient to increased risk of bleeding.

In case of an overdose suspicion, coagulation tests can help to determine a bleeding risk (see sections 4.4 and 5.1). A calibrated quantitative dTT test or repetitive dTT measurements allow prediction of the time by when certain dabigatran levels will be reached (see section 5.1), also in case additional measures e.g. dialysis have been initiated.

Excessive anticoagulation may require interruption of Pradaxa treatment. In the event of haemorrhagic complications, treatment must be discontinued and the source of bleeding investigated. Since dabigatran is excreted predominantly by the renal route adequate diuresis must be maintained. Depending on the clinical situation appropriate supportive treatment, such as surgical haemostasis and blood volume replacement, should be undertaken at the prescribers discretion.

For situations when rapid reversal of the anticoagulant effect of Pradaxa is required the specific reversal agent (Praxbind, idarucizumab) antagonizing the pharmacodynamics effect of Pradaxa is available (see section 4.4).

Coagulation factor concentrates (activated or non-activated) or recombinant Factor VIIa may be taken into account. There is some experimental evidence to support the role of these medicinal products in reversing the anticoagulant effect of dabigatran, but data on their usefulness in clinical settings and also on the possible risk of rebound thromboembolism is very limited. Coagulation tests may become unreliable following administration of suggested coagulation factor concentrates. Caution should be exercised when interpreting these tests. Consideration should also be given to administration of platelet concentrates in cases where thrombocytopenia is present or long acting antiplatelet drugs have been used. All symptomatic treatment should be given according to the physician's judgement.

Depending on local availability, a consultation of a coagulation expert should be considered in case of major bleedings.

As protein binding is low, dabigatran can be dialysed; there is limited clinical experience to demonstrate the utility of this approach in clinical studies (see section 5.2).

## 5. PHARMACOLOGICAL PROPERTIES

### 5.1 Pharmacodynamic properties

Pharmacotherapeutic group: antithrombotic, direct thrombin inhibitors, ATC code: B01AE07.

#### Mechanism of action

Dabigatran etexilate is a small molecule prodrug which does not exhibit any pharmacological activity. After oral administration, dabigatran etexilate is rapidly absorbed and converted to dabigatran by esterase-catalysed hydrolysis in plasma and in the liver. Dabigatran is a potent, competitive, reversible direct thrombin inhibitor and is the main active principle in plasma.

Since thrombin (serine protease) enables the conversion of fibrinogen into fibrin during the coagulation cascade, its inhibition prevents the development of thrombus. Dabigatran also inhibits free thrombin, fibrin-bound thrombin and thrombin-induced platelet aggregation.

#### Pharmacodynamic effects

*In-vivo* and *ex-vivo* animal studies have demonstrated antithrombotic efficacy and anticoagulant activity of dabigatran after intravenous administration and of dabigatran etexilate after oral administration in various animal models of thrombosis.

There is a clear correlation between plasma dabigatran concentration and degree of anticoagulant effect based on phase II studies. Dabigatran prolongs the thrombin time (TT), ECT, and aPTT.

The calibrated quantitative diluted TT (dTT) test provides an estimation of dabigatran plasma concentration that can be compared to the expected dabigatran plasma concentrations. When the calibrated dTT assay delivers a dabigatran plasma concentration result at or below the limit of quantification, an additional coagulation assay such as TT, ECT or aPTT should be considered.

The ECT can provide a direct measure of the activity of direct thrombin inhibitors.

The aPTT test is widely available and provides an approximate indication of the anticoagulation intensity achieved with dabigatran. However, the aPTT test has limited sensitivity and is not suitable for precise quantification of anticoagulant effect, especially at high plasma concentrations of dabigatran. Although high aPTT values should be interpreted with caution, a high aPTT value indicates that the patient is anticoagulated.

In general, it can be assumed that these measures of anti-coagulant activity may reflect dabigatran levels and can provide guidance for the assessment of bleeding risk, i.e. exceeding the 90<sup>th</sup> percentile

of dabigatran trough levels or a coagulation assay such as aPTT measured at trough (for aPTT thresholds see section 4.4, table 2) is considered to be associated with an increased risk of bleeding.

#### Primary Prevention of Venous Thromboembolism in Orthopaedic Surgery (pVTEp orthopaedic surgery)

Steady state (after day 3) geometric mean dabigatran peak plasma concentration, measured around 2 hours after 220 mg dabigatran etexilate administration, was 70.8 ng/mL, with a range of 35.2-162 ng/mL (25<sup>th</sup>–75<sup>th</sup> percentile range). The dabigatran geometric mean trough concentration, measured at the end of the dosing interval (i.e. 24 hours after a 220 mg dabigatran dose), was on average 22.0 ng/mL, with a range of 13.0-35.7 ng/mL (25<sup>th</sup>-75<sup>th</sup> percentile range).

In a dedicated study exclusively in patients with moderate renal impairment (creatinine clearance, CrCL 30-50 mL/min) treated with dabigatran etexilate 150 mg QD, the dabigatran geometric mean trough concentration, measured at the end of the dosing interval, was on average 47.5 ng/mL, with a range of 29.6 - 72.2 ng/mL (25<sup>th</sup>-75<sup>th</sup> percentile range).

In patients treated for prevention of VTEs after hip or knee replacement surgery with 220 mg dabigatran etexilate once daily,

- the 90<sup>th</sup> percentile of dabigatran plasma concentrations was 67 ng/mL, measured at trough (20-28 hours after the previous dose) (see section 4.4 and 4.9),
- the 90<sup>th</sup> percentile of aPTT at trough (20-28 hours after the previous dose) was 51 seconds, which would be 1.3-fold upper limit of normal.

The ECT was not measured in patients treated for prevention of VTEs after hip or knee replacement surgery with 220 mg dabigatran etexilate once daily.

#### Prevention of stroke and SEE in adult patients with NVAf with one or more risk factors (SPAF)

Steady state geometric mean dabigatran peak plasma concentration, measured around 2 hours after 150 mg dabigatran etexilate administration twice daily, was 175 ng/mL, with a range of 117-275 ng/mL (25<sup>th</sup>-75<sup>th</sup> percentile range). The dabigatran geometric mean trough concentration, measured at trough in the morning, at the end of the dosing interval (i.e. 12 hours after the 150 mg dabigatran evening dose), was on average 91.0 ng/mL, with a range of 61.0-143 ng/mL (25<sup>th</sup>-75<sup>th</sup> percentile range). For patients with NVAf treated for prevention of stroke and SEE with 150 mg dabigatran etexilate twice daily,

- the 90<sup>th</sup> percentile of dabigatran plasma concentrations measured at trough (10-16 hours after the previous dose) was about 200 ng/mL,
- an ECT at trough (10-16 hours after the previous dose), elevated approximately 3-fold upper limit of normal refers to the observed 90<sup>th</sup> percentile of ECT prolongation of 103 seconds,
- an aPTT ratio greater than 2-fold upper limit of normal (aPTT prolongation of about 80 seconds), at trough (10-16 hours after the previous dose) reflects the 90<sup>th</sup> percentile of observations.

#### Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE), and prevention of recurrent DVT and PE in adults (DVT/PE)

In patients treated for DVT and PE with 150 mg dabigatran etexilate twice daily, the dabigatran geometric mean trough concentration, measured within 10–16 hours after dose, at the end of the dosing interval (i.e. 12 hours after the 150 mg dabigatran evening dose), was 59.7 ng/ml, with a range of 38.6 - 94.5 ng/ml (25<sup>th</sup>-75<sup>th</sup> percentile range). For treatment of DVT and PE, with dabigatran etexilate 150 mg twice daily,

- the 90<sup>th</sup> percentile of dabigatran plasma concentrations measured at trough (10-16 hours after the previous dose) was about 146 ng/ml,
- an ECT at trough (10-16 hours after the previous dose), elevated approximately 2.3-fold compared to baseline refers to the observed 90<sup>th</sup> percentile of ECT prolongation of 74 seconds,
- the 90<sup>th</sup> percentile of aPTT at trough (10-16 hours after the previous dose) was 62 seconds, which would be 1.8-fold compared to baseline.

In patients treated for prevention of recurrent of DVT and PE with 150 mg dabigatran etexilate twice daily no pharmacokinetic data are available.

### Clinical efficacy and safety

#### *Ethnic origin*

No clinically relevant ethnic differences among Caucasians, African-American, Hispanic, Japanese or Chinese patients were observed.

#### *Clinical trials in Venous Thromboembolism (VTE) prophylaxis following major joint replacement surgery*

In 2 large randomized, parallel group, double-blind, dose-confirmatory trials, patients undergoing elective major orthopaedic surgery (one for knee replacement surgery and one for hip replacement surgery) received Pradaxa 75 mg or 110 mg within 1-4 hours of surgery followed by 150 mg or 220 mg once daily thereafter, haemostasis having been secured, or enoxaparin 40 mg on the day prior to surgery and daily thereafter.

In the RE-MODEL trial (knee replacement) treatment was for 6-10 days and in the RE-NOVATE trial (hip replacement) for 28-35 days. Totals of 2,076 patients (knee) and 3,494 (hip) were treated respectively.

Composite of total VTE (including PE, proximal and distal DVT, whatever symptomatic or asymptomatic detected by routine venography) and all-cause mortality constituted the primary end-point for both studies. Composite of major VTE (including PE and proximal DVT, whatever symptomatic or asymptomatic detected by routine venography) and VTE-related mortality constituted a secondary end-point and is considered of better clinical relevance.

Results of both studies showed that the antithrombotic effect of Pradaxa 220 mg and 150 mg were statistically non-inferior to that of enoxaparin on total VTE and all-cause mortality. The point estimate for incidence of Major VTE and VTE related mortality for the 150 mg dose was slightly worse than enoxaparin (table 10). Better results were seen with the 220 mg dose where the point estimate of Major VTE was slightly better than enoxaparin (table 10).

The clinical studies have been conducted in a patient population with a mean age > 65 years.

There were no differences in the phase 3 clinical studies for efficacy and safety data between men and women.

In the studied patient population of RE-MODEL and RE-NOVATE (5,539 patients treated), 51 % suffered from concomitant hypertension, 9 % from concomitant diabetes, 9 % from concomitant coronary artery disease and 20 % had a history of venous insufficiency. None of these diseases showed an impact on the effects of dabigatran on VTE-prevention or bleeding rates.

Data for the major VTE and VTE-related mortality endpoint were homogeneous with regards to the primary efficacy endpoint and are shown in table 10.

Data for the total VTE and all cause mortality endpoint are shown in table 11.

Data for adjudicated major bleeding endpoints are shown in table 12 below.



Table 10: Analysis of major VTE and VTE-related mortality during the treatment period in the RE-MODEL and the RE-NOVATE orthopaedic surgery studies.

Trial	Dabigatran etexilate 220 mg once daily	Dabigatran etexilate 150 mg once daily	Enoxaparin 40 mg
RE-NOVATE (hip)			
N	909	888	917
Incidences (%)	28 (3.1)	38 (4.3)	36 (3.9)
Risk ratio over enoxaparin	0.78	1.09	
95 % CI	0.48, 1.27	0.70, 1.70	
RE-MODEL (knee)			
N	506	527	511
Incidences (%)	13 (2.6)	20 (3.8)	18 (3.5)
Risk ratio over enoxaparin	0.73	1.08	
95 % CI	0.36, 1.47	0.58, 2.01	

Table 11: Analysis of total VTE and all cause mortality during the treatment period in the RE-NOVATE and the RE-MODEL orthopaedic surgery studies.

Trial	Dabigatran etexilate 220 mg once daily	Dabigatran etexilate 150 mg once daily	Enoxaparin 40 mg
RE-NOVATE (hip)			
N	880	874	897
Incidences (%)	53 (6.0)	75 (8.6)	60 (6.7)
Risk ratio over enoxaparin	0.9	1.28	
95 % CI	(0.63, 1.29)	(0.93, 1.78)	
RE-MODEL (knee)			
N	503	526	512
Incidences (%)	183 (36.4)	213 (40.5)	193 (37.7)
Risk ratio over enoxaparin	0.97	1.07	
95 % CI	(0.82, 1.13)	(0.92, 1.25)	

Table 12: Major bleeding events by treatment in the individual RE-MODEL and the RE-NOVATE studies.

Trial	Dabigatran etexilate 220 mg once daily	Dabigatran etexilate 150 mg once daily	Enoxaparin 40 mg
RE-NOVATE (hip)			
Treated patients N	1,146	1,163	1,154
Number of MBE N(%)	23 (2.0)	15 (1.3)	18 (1.6)
RE-MODEL (knee)			
Treated patients N	679	703	694
Number of MBE N(%)	10 (1.5)	9 (1.3)	9 (1.3)

*Prevention of stroke and SEE in adult patients with NVAF with one or more risk factors*

The clinical evidence for the efficacy of dabigatran etexilate is derived from the RE-LY study (Randomized Evaluation of Long-term anticoagulant therapy) a multi-centre, multi-national, randomized parallel group study of two blinded doses of dabigatran etexilate (110 mg and 150 mg twice daily) compared to open-label warfarin in patients with atrial fibrillation at moderate to high risk of stroke and SEE. The primary objective in this study was to determine if dabigatran etexilate was non-inferior to warfarin in reducing the occurrence of the composite endpoint stroke and SEE. Statistical superiority was also analyzed.

In the RE-LY study, a total of 18,113 patients were randomized, with a mean age of 71.5 years and a mean CHADS<sub>2</sub> score of 2.1. The patient population was 64 % male, 70 % Caucasian and 16 % Asian.

For patients randomized to warfarin, the mean percentage of time in therapeutic range (TTR) (INR 2-3) was 64.4 % (median TTR 67 %).

The RE-LY study demonstrated that dabigatran etexilate, at a dose of 110 mg twice daily, is non-inferior to warfarin in the prevention of stroke and SEE in subjects with atrial fibrillation, with a reduced risk of ICH, total bleeding and major bleeding. The dose of 150 mg twice daily reduces significantly the risk of ischemic and haemorrhagic stroke, vascular death, ICH and total bleeding compared to warfarin. Major bleeding rates with this dose were comparable to warfarin. Myocardial infarction rates were slightly increased with dabigatran etexilate 110 mg twice daily and 150 mg twice daily compared to warfarin (hazard ratio 1.29; p=0.0929 and hazard ratio 1.27; p=0.1240, respectively). With improving monitoring of INR the observed benefits of dabigatran etexilate compared to warfarin diminish.

Tables 13-15 display details of key results in the overall population:

Table 13: Analysis of first occurrence of stroke or SEE (primary endpoint) during the study period in RE-LY.

	Dabigatran etexilate 110 mg twice daily	Dabigatran etexilate 150 mg twice daily	Warfarin
Subjects randomized	6,015	6,076	6,022
Stroke and/or SEE			
Incidences (%)	183 (1.54)	135 (1.12)	203 (1.72)
Hazard ratio over warfarin (95 % CI)	0.89 (0.73, 1.09)	0.65 (0.52, 0.81)	
p value superiority	p=0.2721	p=0.0001	

% refers to yearly event rate

Table 14: Analysis of first occurrence of ischemic or haemorrhagic strokes during the study period in RE-LY.

	Dabigatran etexilate 110 mg twice daily	Dabigatran etexilate 150 mg twice daily	Warfarin
Subjects randomized	6,015	6,076	6,022
Stroke			
Incidences (%)	171 (1.44)	123 (1.02)	187 (1.59)
Hazard ratio vs. warfarin (95 % CI)	0.91 (0.74, 1.12)	0.64 (0.51, 0.81)	
p-value	0.3553	0.0001	
SEE			
Incidences (%)	15 (0.13)	13 (0.11)	21 (0.18)
Hazard ratio vs. warfarin (95 % CI)	0.71 (0.37, 1.38)	0.61 (0.30, 1.21)	
p-value	0.3099	0.1582	
Ischemic stroke			
Incidences (%)	152 (1.28)	104 (0.86)	134 (1.14)
Hazard ratio vs. warfarin (95 % CI)	1.13 (0.89, 1.42)	0.76 (0.59, 0.98)	
p-value	0.3138	0.0351	
Haemorrhagic stroke			
Incidences (%)	14 (0.12)	12 (0.10)	45 (0.38)
Hazard ratio vs. warfarin (95 % CI)	0.31 (0.17, 0.56)	0.26 (0.14, 0.49)	
p-value	0.0001	< 0.0001	

% refers to yearly event rate

Table 15: Analysis of all cause and cardiovascular survival during the study period in RE-LY.

	Dabigatran etexilate 110 mg twice daily	Dabigatran etexilate 150 mg twice daily	Warfarin
Subjects randomized	6,015	6,076	6,022
All-cause mortality			
Incidences (%)	446 (3.75)	438 (3.64)	487 (4.13)
Hazard ratio vs. warfarin (95 % CI)	0.91 (0.80, 1.03)	0.88 (0.77, 1.00)	
p-value	0.1308	0.0517	
Vascular mortality			
Incidences (%)	289 (2.43)	274 (2.28)	317 (2.69)
Hazard ratio vs. warfarin (95 % CI)	0.90 (0.77, 1.06)	0.85 (0.72, 0.99)	
p-value	0.2081	0.0430	

% refers to yearly event rate

Tables 16-18 display results of the primary efficacy and safety endpoint in relevant sub-populations:

For the primary endpoint, stroke and SEE, no subgroups (i.e., age, weight, gender, renal function, ethnicity, etc.) were identified with a different risk ratio compared to warfarin.

Table 16: Hazard Ratio and 95 % CI for stroke/SEE by subgroups

Endpoint	Dabigatran etexilate 110 mg twice daily vs. Warfarin	Dabigatran etexilate 150 mg twice daily vs. warfarin
Age (years)		
< 65	1.10 (0.64, 1.87)	0.51 (0.26, 0.98)
65 ≤ and < 75	0.86 (0.62, 1.19)	0.67 (0.47, 0.95)
≥ 75	0.88 (0.66, 1.17)	0.68 (0.50, 0.92)
≥ 80	0.68 (0.44, 1.05)	0.67 (0.44, 1.02)
CrCL(mL/min)		
30 ≤ and < 50	0.89 (0.61, 1.31)	0.48 (0.31, 0.76)
50 ≤ and < 80	0.91 (0.68, 1.20)	0.65 (0.47, 0.88)
≥ 80	0.81 (0.51, 1.28)	0.69 (0.43, 1.12)

For the primary safety endpoint of major bleeding there was an interaction of treatment effect and age. The relative risk of bleeding with dabigatran compared to warfarin increased with age. Relative risk was highest in patients ≥ 75 years. The concomitant use of antiplatelets ASA or clopidogrel approximately doubles MBE rates with both dabigatran etexilate and warfarin. There was no significant interaction of treatment effects with the subgroups of renal function and CHADS<sub>2</sub> score.

Table 17: Hazard Ratio and 95 % CI for major bleeds by subgroups

Endpoint	Dabigatran etexilate 110 mg twice daily vs. Warfarin	Dabigatran etexilate 150 mg twice daily vs. Warfarin
Age (years)		
< 65	0.32 (0.18, 0.57)	0.35 (0.20, 0.61)
65 ≤ and < 75	0.71 (0.56, 0.89)	0.82 (0.66, 1.03)
≥ 75	1.01 (0.84, 1.23)	1.19 (0.99, 1.43)
≥ 80	1.14 (0.86, 1.51)	1.35 (1.03, 1.76)
CrCL(mL/min)		
30 ≤ and < 50	1.02 (0.79, 1.32)	0.94 (0.73, 1.22)
50 ≤ and < 80	0.75 (0.61, 0.92)	0.90 (0.74, 1.09)
≥ 80	0.59 (0.43, 0.82)	0.87 (0.65, 1.17)
ASA use	0.84 (0.69, 1.03)	0.97 (0.79, 1.18)
Clopidogrel use	0.89 (0.55, 1.45)	0.92 (0.57, 1.48)

RELY-ABLE (Long term multi-center extension of dabigatran treatment in patients with atrial fibrillation who completed the RE-LY trial)

The RE-LY extension study (RELY-ABLE) provided additional safety information for a cohort of patients which continued the same dose of dabigatran etexilate as assigned in the RE-LY trial. Patients were eligible for the RELY-ABLE trial if they had not permanently discontinued study medication at the time of their final RE-LY study visit. Enrolled patients continued to receive the same double-blind dabigatran etexilate dose randomly allocated in RE-LY, for up to 43 months of follow up after RE-LY (total mean follow-up RE-LY + RELY-ABLE, 4.5 years). There were 5897 patients enrolled, representing 49 % of patients originally randomly assigned to receive dabigatran etexilate in RE-LY and 86 % of RELY-ABLE-eligible patients.

During the additional 2.5 years of treatment in RELY-ABLE, with a maximum exposure of over 6 years (total exposure in RELY + RELY-ABLE), the long-term safety profile of dabigatran etexilate was confirmed for both test doses 110 mg b.i.d. and 150 mg b.i.d.. No new safety findings were observed.

The rates of outcome events including, major bleed and other bleeding events were consistent with those seen in RE-LY.

Paediatric population

The European Medicines Agency has waived the obligation to submit the results of studies with Pradaxa in all subsets of the paediatric population in prevention of thromboembolic events for the granted indication (see section 4.2 for information on paediatric use).

Ethnic origin (SPAF)

No clinically relevant ethnic differences among Caucasians, African-American, Hispanic, Japanese or Chinese patients were observed.

Clinical efficacy and safety (DVT/PE treatment)

*Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE) in adults (DVT/PE treatment)*

The efficacy and safety was investigated in two multi-center, randomised, double blind, parallel-group, replicate studies RE-COVER and RE-COVER II. These studies compared dabigatran etexilate (150 mg bid) with warfarin (target INR 2.0-3.0) in patients with acute DVT and/or PE. The primary objective of these studies was to determine if dabigatran etexilate was non-inferior to warfarin in reducing the occurrence of the primary endpoint which was the composite of recurrent symptomatic DVT and/or PE and related deaths within the 6 month treatment period.

In the pooled RE-COVER and RE-COVER II studies, a total of 5,153 patients were randomized and 5,107 were treated.

The duration of treatment with fixed dose of dabigatran was 174.0 days without coagulation monitoring. For patients randomized to warfarin, the median time in therapeutic range (INR 2.0 to 3.0) was 60.6 %.

The trials, demonstrated that treatment with dabigatran etexilate 150 mg twice daily was non-inferior to the treatment with warfarin (non-inferiority margin for RE-COVER, and RE-COVER II: 3.6 for risk difference and 2.75 for hazard ratio).

Table 18: Analysis of the primary and secondary efficacy endpoints (VTE is a composite of DVT and/or PE) until the end of post-treatment period for the pooled studies RE-COVER and RE-COVER II

	Dabigatran etexilate 150 mg twice daily	Warfarin
Treated patients	2,553	2,554
Recurrent symptomatic VTE and VTE-related death	68 ( 2.7 %)	62 ( 2.4 %)
Hazard ratio vs warfarin (95% confidence interval)	1.09 (0.77, 1.54)	
Secondary efficacy endpoints		
Recurrent symptomatic VTE and all-cause deaths	109 (4.3 %)	104 (4.1 %)
95 % confidence interval	3.52, 5.13	3.34, 4.91
Symptomatic DVT	45 (1.8 %)	39 (1.5 %)
95 % confidence interval	1.29, 2.35	1.09, 2.08
Symptomatic PE	27 (1.1 %)	26 (1.0 %)
95 % confidence interval	0.70, 1.54	0.67, 1.49
VTE-related deaths	4 (0.2 %)	3 (0.1 %)
95 % confidence interval	0.04, 0.40	0.02, 0.34
All-cause deaths	51 (2.0 %)	52 (2.0 %)
95 % confidence interval	1.49, 2.62	1.52, 2.66

#### Ethnic origin (DVT/PE treatment)

No clinically relevant ethnic differences among Caucasians, African-American, Hispanic, Japanese or Chinese patients were observed.

#### Paediatric population (DVT/PE treatment)

The European Medicines Agency has deferred the obligation to submit the results of studies with Pradaxa in all subsets of the paediatric population for DVT/PE treatment (see section 4.2 for information on paediatric use).

The pharmacokinetics and pharmacodynamics of dabigatran etexilate administered twice daily for three consecutive days (total 6 doses) at the end of standard anticoagulant therapy were assessed in an open-label safety and tolerability study in 9 stable adolescents (12 to < 18 years). All patients received an initial oral dose of 1.71 ( $\pm$  10%) mg/kg of dabigatran etexilate (80 % of the adult dose of 150 mg/70 kg adjusted for the patient's weight). Based on dabigatran concentrations and clinical assessment, the dose was subsequently modified to a target dose of 2.14 ( $\pm$  10 %) mg/kg of dabigatran etexilate (100 % of the adult dose adjusted for the patient's weight). In this small number of adolescents, dabigatran etexilate capsules were apparently tolerated with only three mild and transient gastrointestinal adverse events reported by two patients. According to the relatively low exposure, coagulation at 72 hrs (presumed dabigatran trough level at steady state or close to steady state conditions) was only slightly prolonged with aPTT at maximum 1.60 fold, ECT 1.86 fold, and Hemoclot<sup>®</sup> TT (Anti-FIIa) 1.36 fold, respectively. Dabigatran plasma concentrations observed at 72 hrs were relatively low, between 32.9 ng/mL and 97.2 ng/mL at final doses between 100 mg and 150 mg (gMean dose normalized total dabigatran plasma concentration of 0.493 ng/mL/mg).

#### Clinical efficacy and safety (DVT/PE prevention)

##### *Prevention of recurrent deep vein thrombosis (DVT) and pulmonary embolism (PE) in adults (DVT/PE prevention)*

Two randomized, parallel group, double-blind studies were performed in patients previously treated with anticagulation therapy. RE-MEDY, warfarin controlled study, enrolled patients already treated for 3 to 12 months with the need for further anticoagulant treatment and RE-SONATE, the placebo controlled study, enrolled patients already treated for 6 to 18 months with Vitamin K inhibitors.

The objective of the RE-MEDY study was to compare the safety and efficacy of oral dabigatran etexilate (150 mg bid) to warfarin (target INR 2.0-3.0) for the long-term treatment and prevention of recurrent, symptomatic DVT and/or PE. A total of 2,866 patients were randomized and 2,856 patients were treated. Duration of dabigatran etexilate treatment ranged from 6 to 36 months (median 534.0 days). For patients randomized to warfarin, the median time in therapeutic range (INR 2.0-3.0) was 64.9 %.

RE-MEDY demonstrated that treatment with dabigatran etexilate 150 mg twice daily was non-inferior to warfarin non-inferiority margin: 2.85 for hazard ratio and 2.8 for risk difference).

Table 19: Analysis of the primary and secondary efficacy endpoints (VTE is a composite of DVT and/or PE) until the end of post-treatment period for the RE-MEDY study

	Dabigatran etexilate 150 mg twice daily	Warfarin
Treated patients	1430	1426
Recurrent symptomatic VTE and VTE-related death	26 (1.8 %)	18 (1.3 %)
Hazard ratio vs warfarin (95% confidence interval)	1.44 (0.78, 2.64)	
non-inferiority margin	2.85	
Patients with event at 18 months	22	17
Cumulative risk at 18 months (%)	1.7	1.4
Risk difference vs. warfarin (%)	0.4	
95% confidence interval		
non-inferiority margin	2.8	
Secondary efficacy endpoints		
Recurrent symptomatic VTE and all-cause deaths	42 (2.9 %)	36 (2.5 %)
95 % confidence interval	2.12, 3.95	1.77, 3.48
Symptomatic DVT	17 (1.2 %)	13 (0.9 %)
95 % confidence interval	0.69, 1.90	0.49, 1.55
Symptomatic PE	10 (0.7 %)	5 (0.4 %)
95 % confidence interval	0.34, 1.28	0.11, 0.82
VTE-related deaths	1 (0.1 %)	1 (0.1 %)
95 % confidence interval	0.00, 0.39	0.00, 0.39
All-cause deaths	17 (1.2 %)	19 (1.3 %)
95 % confidence interval	0.69, 1.90	0.80, 2.07

The objective of the RE-SONATE study was to evaluate superiority of dabigatran etexilate versus placebo for the prevention of recurrent symptomatic DVT and/or PE in patients who had already completed 6 to 18 months of treatment with VKA. The intended therapy was 6 months dabigatran etexilate 150 mg twice daily without need for monitoring.

RE-SONATE demonstrated dabigatran etexilate was superior to placebo for the prevention of recurrent symptomatic DVT/PE events including unexplained deaths, with a risk reduction from 5.6 % to 0.4 % (relative risk reduction 92 % based on hazard ratio ) during the treatment period ( $p < 0.0001$ ). All secondary and sensitivity analyses of the primary endpoint and all secondary endpoints showed superiority of dabigatran etexilate over placebo.

The study included observational follow-up for 12 months after the conclusion of treatment. After discontinuation of study medication the effect was maintained until the end of the follow-up, indicating that the initial treatment effect of dabigatran etexilate was sustained. No rebound effect was observed. At the end of the follow-up VTE events in patients treated with dabigatran etexilate was 6.9 % vs. 10.7 % among the placebo group (hazard ratio 0.61 (95% CI 0.42, 0.88),  $p = 0.0082$ ).

Table 20: Analysis of the primary and secondary efficacy endpoints (VTE is a composite of DVT and/or PE) until the end of post-treatment period for the RE-SONATE study.

	Dabigatran etexilate 150 mg twice daily	Placebo
Treated patients	681	662
Recurrent symptomatic VTE and related deaths	3 (0.4 %)	37 (5.6 %)
Hazard Ratio vs placebo (95% confidence interval)	0.08 (0.02, 0.25)	
p-value for superiority	< 0.0001	
Secondary efficacy endpoints		
Recurrent symptomatic VTE and all-cause deaths	3 (0.4 %)	37 (5.6 %)
95% confidence interval	0.09, 1.28	3.97, 7.62
Symptomatic DVT	2 (0.3 %)	23 (3.5 %)
95% confidence interval	0.04, 1.06	2.21, 5.17
Symptomatic PE	1 (0.1 %)	14 (2.1 %)
95% confidence interval	0.00, 0.82	1.16, 3.52
VTE-related deaths	0 (0)	0 (0)
95% confidence interval	0.00, 0.54	0.00, 0.56
Unexplained deaths	0 (0)	2 (0.3 %)
95% confidence interval	0.00, 0.54	0.04, 1.09
All-cause deaths	0 (0)	2 (0.3 %)
95% confidence interval	0.00, 0.54	0.04, 1.09

#### Ethnic origin (DVT/PE prevention)

No clinically relevant ethnic differences among Caucasians, African-American, Hispanic, Japanese or Chinese patients were observed.

#### Paediatric population (DVT/PE prevention)

The European Medicines Agency has deferred the obligation to submit the results of studies with Pradaxa in all subsets of the paediatric population for DVT/PE prevention (see section 4.2 for information on paediatric use).

#### *Clinical trials for the prevention of thromboembolism in patients with prosthetic heart valves*

A phase II study examined dabigatran etexilate and warfarin in a total of 252 patients with recent mechanical valve replacement surgery (i.e. within the current hospital stay) and in patients who received a mechanical heart valve replacement more than three months ago. More thromboembolic events (mainly strokes and symptomatic/asymptomatic prosthetic valve thrombosis) and more bleeding events were observed with dabigatran etexilate than with warfarin. In the early post-operative patients, major bleeding manifested predominantly as haemorrhagic pericardial effusions, specifically in patients who started dabigatran etexilate early (i.e. on Day 3) after heart valve replacement surgery (see section 4.3).



## 5.2 Pharmacokinetic properties

After oral administration, dabigatran etexilate is rapidly and completely converted to dabigatran, which is the active form in plasma. The cleavage of the prodrug dabigatran etexilate by esterase-catalysed hydrolysis to the active principle dabigatran is the predominant metabolic reaction. The absolute bioavailability of dabigatran following oral administration of Pradaxa was approximately 6.5 %.

After oral administration of Pradaxa in healthy volunteers, the pharmacokinetic profile of dabigatran in plasma is characterized by a rapid increase in plasma concentrations with  $C_{\max}$  attained within 0.5 and 2.0 hours post administration.

### Absorption

A study evaluating post-operative absorption of dabigatran etexilate, 1-3 hours following surgery, demonstrated relatively slow absorption compared with that in healthy volunteers, showing a smooth plasma concentration-time profile without high peak plasma concentrations. Peak plasma concentrations are reached at 6 hours following administration in a postoperative period due to contributing factors such as anaesthesia, gastrointestinal paresis, and surgical effects independent of the oral medicinal product formulation. It was demonstrated in a further study that slow and delayed absorption is usually only present on the day of surgery. On subsequent days absorption of dabigatran is rapid with peak plasma concentrations attained 2 hours after medicinal product administration.

Food does not affect the bioavailability of dabigatran etexilate but delays the time to peak plasma concentrations by 2 hours.

The oral bioavailability may be increased by 75 % after a single dose and 37 % at steady state compared to the reference capsule formulation when the pellets are taken without the Hydroxypropylmethylcellulose (HPMC) capsule shell. Hence, the integrity of the HPMC capsules should always be preserved in clinical use to avoid unintentionally increased bioavailability of dabigatran etexilate. Therefore, patients should be advised not to open the capsules and taking the pellets alone (e.g. sprinkled over food or into beverages) (see section 4.2).

### Distribution

Low (34-35 %) concentration independent binding of dabigatran to human plasma proteins was observed. The volume of distribution of dabigatran of 60–70 L exceeded the volume of total body water indicating moderate tissue distribution of dabigatran.

$C_{\max}$  and the area under the plasma concentration-time curve were dose proportional. Plasma concentrations of dabigatran showed a biexponential decline with a mean terminal half-life of 11 hours in healthy elderly subjects. After multiple doses a terminal half-life of about 12-14 hours was observed. The half-life was independent of dose. Half-life is prolonged if renal function is impaired as shown in table 21.

### Biotransformation

Metabolism and excretion of dabigatran were studied following a single intravenous dose of radiolabeled dabigatran in healthy male subjects. After an intravenous dose, the dabigatran-derived radioactivity was eliminated primarily in the urine (85 %). Faecal excretion accounted for 6 % of the administered dose. Recovery of the total radioactivity ranged from 88-94 % of the administered dose by 168 hours post dose.

Dabigatran is subject to conjugation forming pharmacologically active acylglucuronides. Four positional isomers, 1-O, 2-O, 3-O, 4-O-acylglucuronide exist, each accounts for less than 10 % of total dabigatran in plasma. Traces of other metabolites were only detectable with highly sensitive analytical methods. Dabigatran is eliminated primarily in the unchanged form in the urine, at a rate of approximately 100 mL/min corresponding to the glomerular filtration rate.

## Special populations

### Renal insufficiency

In phase I studies the exposure (AUC) of dabigatran after the oral administration of Pradaxa is approximately 2.7-fold higher in volunteers with moderate renal insufficiency (CrCL between 30-50 mL/min) than in those without renal insufficiency.

In a small number of volunteers with severe renal insufficiency (CrCL 10-30 mL/min), the exposure (AUC) to dabigatran was approximately 6 times higher and the half-life approximately 2 times longer than that observed in a population without renal insufficiency (see sections 4.2, 4.3 and 4.4).

Table 21: Half-life of total dabigatran in healthy subjects and subjects with impaired renal function.

glomerular filtration rate (CrCL, [mL/min])	gMean (gCV %; range) half-life [h]
≥ 80	13.4 (25.7 %; 11.0-21.6)
≥ 50-< 80	15.3 (42.7 %; 11.7-34.1)
≥ 30-< 50	18.4 (18.5 %; 13.3-23.0)
< 30	27.2 (15.3 %; 21.6-35.0)

Additionally, dabigatran exposure (at trough and peak) was assessed in a prospective open label randomized pharmacokinetic study in NVAf patients with severe renal impairment (defined as creatinine clearance [CrCl] 15-30 mL/min) receiving dabigatran etexilate 75 mg twice daily. This regimen resulted in a geometric mean trough concentration of 155 ng/ml (gCV of 76.9 %), measured immediately before administration of the next dose and in a geometric mean peak concentration of 202 ng/ml (gCV of 70.6 %) measured two hours after the administration of the last dose.

Clearance of dabigatran by haemodialysis was investigated in 7 patients with end-stage renal disease (ESRD) without atrial fibrillation. Dialysis was conducted with 700 mL/min dialysate flow rate, four hour duration and a blood flow rate of either 200 mL/min or 350-390 mL/min. This resulted in a removal of 50 % to 60 % of dabigatran concentrations, respectively. The amount of drug cleared by dialysis is proportional to the blood flow rate up to a blood flow rate of 300 mL/min. The anticoagulant activity of dabigatran decreased with decreasing plasma concentrations and the PK/PD relationship was not affected by the procedure.

The median CrCL in RE-LY was 68.4 mL/min. Almost half (45.8 %) of the RE-LY patients had a CrCL > 50-< 80 mL/min. Patients with moderate renal impairment (CrCL between 30-50 mL/min) had on average 2.29-fold and 1.81-fold higher pre- and post-dose dabigatran plasma concentrations, respectively, when compared with patients without renal impairment (CrCL ≥ 80 mL/min).

The median CrCL in the RE-COVER study was 100.4 mL/min. 21.7 % of patients had mild renal impairment (CrCL > 50 - < 80 mL/min) and 4.5% of patients had a moderate renal impairment (CrCL between 30 and 50 mL/min). Patients with mild and moderate renal impairment had at steady state an average 1.8-fold and 3.6-fold higher pre-dose dabigatran plasma concentrations compared with patients with CrCL > 80 mL/min, respectively. Similar values for CrCL were found in RE-COVER II.

The median CrCL in the RE-MEDY and RE-SONATE studies were 99.0 mL/min and 99.7 mL/min, respectively. 22.9 % and 22.5 % of the patients had a CrCL > 50-< 80 mL/min, and 4.1 % and 4.8 % had a CrCL between 30 and 50 mL/min in in the RE-MEDY and RE-SONATE studies.

### Elderly patients

Specific pharmacokinetic phase I studies with elderly subjects showed an increase of 40 to 60 % in the AUC and of more than 25 % in  $C_{max}$  compared to young subjects.

The effect by age on exposure to dabigatran was confirmed in the RE-LY study with an about 31 % higher trough concentration for subjects  $\geq 75$  years and by about 22 % lower trough level for subjects  $< 65$  years compared to subjects between 65 and 75 years (see sections 4.2 and 4.4).

#### Hepatic impairment

No change in dabigatran exposure was seen in 12 subjects with moderate hepatic insufficiency (Child Pugh B) compared to 12 controls (see sections 4.2 and 4.4).

#### Body weight

The dabigatran trough concentrations were about 20 % lower in patients with a body weight  $> 100$  kg compared with 50-100 kg. The majority (80.8 %) of the subjects were in the  $\geq 50$  kg and  $< 100$  kg category with no clear difference detected (see sections 4.2 and 4.4). Limited clinical data in patients  $< 50$  kg are available.

#### Gender

Active substance exposure in the primary VTE prevention studies was about 40 % to 50 % higher in female patients and no dose adjustment is recommended. In atrial fibrillation patients females had on average 30 % higher trough and post-dose concentrations. No dose adjustment is required (see section 4.2).

#### Ethnic origin

No clinically relevant inter-ethnic differences among Caucasian, African-American, Hispanic, Japanese or Chinese patients were observed regarding dabigatran pharmacokinetics and pharmacodynamics.

#### Pharmacokinetic interactions

The pro-drug dabigatran etexilate but not dabigatran is a substrate of the efflux transporter P-gp. Therefore concomitant use of P-gp transporter inhibitors (amiodarone, verapamil, clarithromycin, quinidine, dronedarone, ticagrelor and ketoconazole) and inducers (rifampicin) had been investigated (see sections 4.2, 4.4 and 4.5).

*In vitro* interaction studies did not show any inhibition or induction of the principal isoenzymes of cytochrome P450. This has been confirmed by *in vivo* studies with healthy volunteers, who did not show any interaction between this treatment and the following active substances: atorvastatin (CYP3A4), digoxin (P-gp transporter interaction) and diclofenac (CYP2C9).

### **5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on conventional studies of safety pharmacology, repeated dose toxicity and genotoxicity.

Effects observed in the repeat-dose toxicity studies were due to the exaggerated pharmacodynamic effect of dabigatran.

An effect on female fertility was observed in the form of a decrease in implantations and an increase in pre-implantation loss at 70 mg/kg (5-fold the plasma exposure level in patients). At doses that were toxic to the mothers (5- to 10-fold the plasma exposure level in patients), a decrease in foetal body weight and viability along with an increase in foetal variations were observed in rats and rabbits. In the pre- and post-natal study, an increase in foetal mortality was observed at doses that were toxic to the dams (a dose corresponding to a plasma exposure level 4-fold higher than observed in patients).

In lifetime toxicology studies in rats and mice, there was no evidence for a tumorigenic potential of dabigatran up to maximum doses of 200 mg/kg.

Dabigatran, the active moiety of dabigatran etexilate mesilate, is persistent in the environment.

## **6. PHARMACEUTICAL PARTICULARS**

### **6.1 List of excipients**

#### Capsule fill

- Tartaric acid
- Acacia
- Hypromellose
- Dimeticone 350
- Talc
- Hydroxypropylcellulose

#### Capsule shell

- Carrageenan
- Potassium chloride
- Titanium dioxide
- Indigo carmine (E132)
- Hypromellose

#### Black printing ink

- Shellac
- Iron oxide black (E172)
- Potassium hydroxide

### **6.2 Incompatibilities**

Not applicable.

### **6.3 Shelf life**

Blister and bottle: 3 years

Once the bottle is opened, the medicinal product must be used within 4 months.

### **6.4 Special precautions for storage**

#### Blister

Store in the original package in order to protect from moisture.

#### Bottle

Store in the original package in order to protect from moisture. Keep the bottle tightly closed.

### **6.5 Nature and contents of container**

Cartons containing 10 x 1, 30 x 1 or 60 x 1 hard capsules a multipack containing 3 packs of 60 x 1 hard capsules (180 hard capsules) and a multipack containing 2 packs of 50 x 1 hard capsules (100 hard capsules) in perforated aluminium unit dose blisters. Furthermore, cartons containing 6 blister strips (60 x 1) in perforated aluminium unit dose white blisters.

Polypropylene bottle with a screw cap containing 60 hard capsules.

Not all pack sizes may be marketed.

## **6.6 Special precautions for disposal and other handling**

When taking Pradaxa capsules out of the blister pack, the following instructions should be followed:

- One individual blister should be torn off from the blister card along the perforated line.
- The backing foil should be peeled off and the capsule can be removed.
- The hard capsules should not be pushed through the blister foil.
- The blister foil should only be peeled off, when a hard capsule is required.

When taking a hard capsule out of the bottle, the following instructions should be observed:

- The cap opens by pushing and turning.
- After taking the capsule out, the cap should be returned on the bottle right away and the bottle should be tightly closed.

## **7. MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

## **8. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/005  
EU/1/08/442/006  
EU/1/08/442/007  
EU/1/08/442/008  
EU/1/08/442/014  
EU/1/08/442/015  
EU/1/08/442/018

## **9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

Date of first authorisation: 18 March 2008  
Date of latest renewal: 17 January 2013

## **10. DATE OF REVISION OF THE TEXT**

Detailed information on this medicinal product is available on the website of the European Medicines Agency <http://www.ema.europa.eu/>.

## 1. NAME OF THE MEDICINAL PRODUCT

Pradaxa 150 mg hard capsules

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each hard capsule contains 150 mg of dabigatran etexilate (as mesilate).

For the full list of excipients, see section 6.1.

## 3. PHARMACEUTICAL FORM

Hard capsule

Capsules with light blue, opaque cap and white, opaque body of size 0 filled with yellowish pellets. The cap is imprinted with the Boehringer Ingelheim company symbol, the body with "R150".

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Prevention of stroke and systemic embolism in adult patients with non-valvular atrial fibrillation (NVAF), with one or more risk factors, such as prior stroke or transient ischemic attack (TIA); age  $\geq 75$  years; heart failure (NYHA Class  $\geq$  II); diabetes mellitus; hypertension.

Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE), and prevention of recurrent DVT and PE in adults

### 4.2 Posology and method of administration

#### Posology (SPAF, DVT/PE)

#### Prevention of stroke and SEE in adult patients with NVAF with one or more risk factors (SPAF)

The recommended daily dose of Pradaxa is 300 mg taken as one 150 mg capsule twice daily. Therapy should be continued long term.

#### Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE), and prevention of recurrent DVT, and PE in adults (DVT/PE)

The recommended daily dose of Pradaxa is 300 mg taken as one 150 mg capsule twice daily following treatment with a parenteral anticoagulant for at least 5 days. The duration of therapy should be individualised after careful assessment of the treatment benefit against the risk for bleeding (see section 4.4). Short duration of therapy (at least 3 months) should be based on transient risk factors (e.g. recent surgery, trauma, immobilisation) and longer durations should be based on permanent risk factors or idiopathic DVT or PE.

#### SPAF, DVT/PE

For the following groups the recommended daily dose of Pradaxa is 220 mg taken as one 110 mg capsule twice daily:

- Patients aged 80 years or above
- Patients who receive concomitant verapamil

For the following groups the daily dose of Pradaxa of 300 mg or 220 mg should be selected based on an individual assessment of the thromboembolic risk and the risk of bleeding:

- Patients between 75-80 years
- Patients with moderate renal impairment
- Patients with gastritis, esophagitis or gastroesophageal reflux
- Other patients at increased risk of bleeding

For DVT/PE the recommendation for the use of Pradaxa 220 mg taken as one 110 mg capsule twice daily is based on pharmacokinetic and pharmacodynamic analyses and has not been studied in this clinical setting.

See further down and sections 4.4, 4.5, 5.1 and 5.2.

In case of intolerability to dabigatran, patients should be instructed to immediately consult their treating physician in order to be switched to alternate acceptable treatment options for prevention of stroke and SEE associated with atrial fibrillation or for DVT/PE.

#### Elderly (SPAF, DVT/PE)

Patients between 75-80 years should be treated with a daily dose of 300 mg taken as one 150 mg capsule twice daily. A dose of 220 mg taken as one 110 mg capsule twice daily can be individually considered, at the discretion of the physician, when the thromboembolic risk is low and the bleeding risk is high (see section 4.4).

Patients aged 80 years or above should be treated with a daily dose of 220 mg taken as one 110 mg capsule twice daily due to the increased risk of bleeding in this population.

As renal impairment may be frequent in the elderly (>75 years), renal function should be assessed by calculating the CrCL prior to initiation of treatment with Pradaxa to exclude patients with severe renal impairment (i.e. CrCL < 30 mL/min). The renal function should also be assessed at least once a year in patients treated with Pradaxa or more frequently as needed in certain clinical situations when it is suspected that the renal function could decline or deteriorate (such as hypovolemia, dehydration, and with certain comedications, etc) (see sections 4.3, 4.4 and 5.2).

#### Patients at risk of bleeding (SPAF, DVT/PE)

Patients with an increased bleeding risk (see sections 4.4, 4.5, 5.1 and 5.2) should be closely monitored clinically (looking for signs of bleeding or anaemia). Dose adjustment should be decided at the discretion of the physician, following assessment of the potential benefit and risk to an individual patient. A coagulation test (see section 4.4) may help to identify patients with an increased bleeding risk caused by excessive dabigatran exposure. When excessive dabigatran exposure is identified in patients at high risk of bleeding, a dose of 220 mg taken as one 110 mg capsule twice daily is recommended. When clinically relevant bleeding occurs, treatment should be interrupted.

For subjects with gastritis, esophagitis, or gastroesophageal reflux, the dose of 220 mg taken as one 110 mg capsule twice daily may be considered due to the elevated risk of major gastro-intestinal bleeding (see section 4.4).

#### Assessment of renal function (SPAF, DVT/PE)

In all patients:

- Renal function should be assessed by calculating the creatinine clearance (CrCL) prior to initiation of treatment with Pradaxa to exclude patients with severe renal impairment (i.e. CrCL < 30 mL/min) (see sections 4.3, 4.4 and 5.2). Pradaxa is contraindicated in patients with severe renal impairment

- Renal function should also be assessed when a decline in renal function is suspected during treatment (e.g. hypovolaemia, dehydration, and in case of concomitant use of certain medicinal products)

Additional requirements in patients with mild to moderate renal impairment and in patients aged over 75 years:

- Renal function should be assessed during treatment with Pradaxa at least once a year or more frequently as needed in certain clinical situations when it is suspected that the renal function could decline or deteriorate (e.g. hypovolaemia, dehydration, and in case of concomitant use of certain medicinal products)

The method used to estimate renal function (CrCL in mL/min) during the clinical development of Pradaxa was the Cockcroft-Gault method (see section 4.2 Pradaxa 75 mg).

### Special populations

#### Renal impairment SPAF, DVT/PE

Treatment with Pradaxa in patients with severe renal impairment (CrCL < 30 mL/min) is contraindicated (see section 4.3).

No dose adjustment is necessary in patients with mild renal impairment (CrCL 50- ≤ 80 mL/min). For patients with moderate renal impairment (CrCL 30-50 mL/min) the recommended dose of Pradaxa is also 300 mg taken as one 150 mg capsule twice daily. However, for patients with high risk of bleeding, a dose reduction of Pradaxa to 220 mg taken as one 110 mg capsule twice daily should be considered (see sections 4.4 and 5.2). Close clinical surveillance is recommended in patients with renal impairment.

#### Concomitant use of Pradaxa with mild to moderate P-glycoprotein (P-gp) inhibitors, i.e. amiodarone, quinidine or verapamil (SPAF, DVT/PE)

No dose adjustment is necessary for concomitant use of amiodarone or quinidine (see sections 4.4, 4.5 and 5.2).

Dosing should be reduced to 220 mg taken as one 110 mg capsule twice daily in patients who receive concomitantly dabigatran etexilate and verapamil (see sections 4.4 and 4.5). In this situation Pradaxa and verapamil should be taken at the same time.

#### Weight (SPAF, DVT/PE)

Given the available clinical and kinetic data, no dose adjustment is necessary (see section 5.2), but close clinical surveillance is recommended in patients with a body weight < 50 kg (see section 4.4).

#### Gender (SPAF, DVT/PE)

Given the available clinical and kinetic data, no dose adjustment is necessary (see section 5.2).

#### Hepatic impairment (SPAF, DVT/PE)

Patients with elevated liver enzymes > 2 upper limit of normal (ULN) were excluded in the main trials. No treatment experience is available for this subpopulation of patients, and therefore the use of Pradaxa is not recommended in this population (see sections 4.4 and 5.2). Hepatic impairment or liver disease expected to have any impact on survival is contraindicated (see section 4.3).



### Switching (SPAF, DVT/PE)

#### *Pradaxa treatment to parenteral anticoagulant*

It is recommended to wait 12 hours after the last dose before switching from dabigatran etexilate to a parenteral anticoagulant (see section 4.5).

#### *Parenteral anticoagulants to Pradaxa*

Discontinue the parenteral anticoagulant and start dabigatran etexilate 0-2 hours prior to the time that the next dose of the alternate therapy would be due, or at the time of discontinuation in case of continuous treatment (e.g. intravenous Unfractionated Heparin (UFH)) (see section 4.5).

#### *Pradaxa treatment to Vitamin K antagonists (VKA)*

Adjust the starting time of the VKA based on CrCL as follows:

- CrCL  $\geq$  50 mL/min, start VKA 3 days before discontinuing dabigatran etexilate
- CrCL  $\geq$  30- $<$  50 mL/min, start VKA 2 days before discontinuing dabigatran etexilate

Because Pradaxa can increase INR, the INR will better reflect VKA's effect only after Pradaxa has been stopped for at least 2 days. Until then, INR values should be interpreted with caution.

#### *VKA to Pradaxa*

The VKA should be stopped. Dabigatran etexilate can be given as soon as the International Normalized Ratio (INR) is  $<$  2.0.

### Cardioversion (SPAF, DVT/PE)

Patients can stay on dabigatran etexilate while being cardioverted.

### Paediatric population (SPAF)

There is no relevant use of Pradaxa in the paediatric population for the indication of prevention of stroke and systemic embolism in patients with NVAf.

### Paediatric population (DVT/PE)

The safety and efficacy of Pradaxa in children from birth to less than 18 years of age have not yet been established. Currently available data are described in section 4.8 and 5.1, but no recommendation on a posology can be made.

### Missed dose (SPAF, DVT/PE)

A forgotten dabigatran etexilate dose may still be taken up to 6 hours prior to the next scheduled dose. From 6 hours prior to the next scheduled dose on, the missed dose should be omitted.

No double dose should be taken to make up for missed individual doses.

### Method of administration (SPAF, DVT/PE)

Pradaxa can be taken with or without food. Pradaxa should be swallowed as a whole with a glass of water, to facilitate delivery to the stomach.

Patients should be instructed not to open the capsule as this may increase the risk of bleeding (see sections 5.2 and 6.6).

### 4.3 Contraindications

- Hypersensitivity to the active substance or to any of the excipients listed in section 6.1
- Patients with severe renal impairment (CrCL < 30 mL/min) (see section 4.2)
- Active clinically significant bleeding
- Lesion or condition, if considered a significant risk factor for major bleeding. This may include current or recent gastrointestinal ulceration, presence of malignant neoplasms at high risk of bleeding, recent brain or spinal injury, recent brain, spinal or ophthalmic surgery, recent intracranial haemorrhage, known or suspected oesophageal varices, arteriovenous malformations, vascular aneurysms or major intraspinal or intracerebral vascular abnormalities
- Concomitant treatment with any other anticoagulants e.g. unfractionated heparin (UFH), low molecular weight heparins (enoxaparin, dalteparin etc), heparin derivatives (fondaparinux etc), oral anticoagulants (warfarin, rivaroxaban, apixaban etc) except under specific circumstances of switching anticoagulant therapy (see section 4.2) or when UFH is given at doses necessary to maintain an open central venous or arterial catheter (see section 4.5)
- Hepatic impairment or liver disease expected to have any impact on survival
- Concomitant treatment with systemic ketoconazole, cyclosporine, itraconazole and dronedarone (see section 4.5)
- Prosthetic heart valves requiring anticoagulant treatment (see section 5.1).

### 4.4 Special warnings and precautions for use

#### Hepatic impairment

Patients with elevated liver enzymes > 2 ULN were excluded from the main trials. No treatment experience is available for this subpopulation of patients, and therefore the use of Pradaxa is not recommended in this population.

#### Haemorrhagic risk

Dabigatran etexilate should be used with caution in conditions with an increased risk of bleeding and in situations with concomitant use of drugs affecting haemostasis by inhibition of platelet aggregation. Bleeding can occur at any site during therapy with dabigatran etexilate. An unexplained fall in haemoglobin and/or haematocrit or blood pressure should lead to a search for a bleeding site.

For situations of life-threatening or uncontrolled bleeding, when rapid reversal of the anticoagulation effect of dabigatran is required, the specific reversal agent (Praxbind, idarucizumab) is available (see section 4.9).

Factors, such as decreased renal function (30-50 mL/min CrCL), age  $\geq$  75 years, low body weight < 50 kg, or mild to moderate P-gp inhibitor co-medication (e.g. amiodarone, quinidine or verapamil) are associated with increased dabigatran plasma levels (see sections 4.2, 4.5 and 5.2).

The concomitant use of ticagrelor increases the exposure to dabigatran and may show pharmacodynamic interaction, which may result in an increased risk of bleeding (see section 4.5).

In a study of prevention of stroke and SEE in adult patients with NVAf, dabigatran etexilate was associated with higher rates of major gastrointestinal (GI) bleeding which was statistically significant for dabigatran etexilate 150 mg twice daily. This increased risk was seen in the elderly ( $\geq$  75 years). Use of acetylsalicylic acid (ASA), clopidogrel or non steroidal antiinflammatory drug (NSAID), as well as the presence of esophagitis, gastritis or gastroesophageal reflux requiring increase the risk of GI bleeding. In these atrial fibrillation patients a dosage of 220 mg dabigatran given as 110 mg capsule twice daily should be considered and posology recommendations in section 4.2 be followed. The administration of a PPI can be considered to prevent GI bleeding.

Bleeding risk may be increased in patients concomitantly treated with selective serotonin re-uptake inhibitors (SSRIs) or selective serotonin norepinephrine re-uptake inhibitors (SNRIs) (see section 4.5).

Close clinical surveillance (looking for signs of bleeding or anaemia) is recommended throughout the treatment period, especially if risk factors are combined (see section 5.1).

Table 1 summarises factors which may increase the haemorrhagic risk. Please also refer to contraindications in section 4.3.

Table 1: Factors which may increase the haemorrhagic risk.

Pharmacodynamic and kinetic factors	Age $\geq$ 75 years
Factors increasing dabigatran plasma levels	<p><u>Major:</u></p> <ul style="list-style-type: none"> <li>• Moderate renal impairment (30-50 mL/min CrCL)</li> <li>• P-gp inhibitor co-medication (some P-gp inhibitors are contraindicated, see section 4.3 and 4.5)</li> </ul> <p><u>Minor:</u></p> <ul style="list-style-type: none"> <li>• Low body weight (&lt; 50 kg)</li> </ul>
Pharmacodynamic interactions	<ul style="list-style-type: none"> <li>• ASA</li> <li>• NSAID</li> <li>• Clopidogrel</li> <li>• SSRIs or SNRIs</li> <li>• Other drugs which may impair haemostasis</li> </ul>
Diseases / procedures with special haemorrhagic risks	<ul style="list-style-type: none"> <li>• Congenital or acquired coagulation disorders</li> <li>• Thrombocytopenia or functional platelet defects</li> <li>• Recent biopsy, major trauma</li> <li>• Bacterial endocarditis</li> <li>• Esophagitis, gastritis or gastroesophageal reflux</li> </ul>

The presence of lesions, conditions, procedures and/or pharmacological treatment (such as NSAIDs, antiplatelets, SSRIs and SNRIs, see section 4.5), which significantly increase the risk of major bleeding requires a careful benefit-risk assessment. Pradaxa should only be given if the benefit outweighs bleeding risks.

Pradaxa does not in general require routine anticoagulant monitoring. However, the measurement of dabigatran related anticoagulation may be helpful to avoid excessive high exposure to dabigatran in the presence of additional risk factors. The INR test is unreliable in patients on Pradaxa and false positive INR elevations have been reported. Therefore INR tests should not be performed. Diluted thrombin time (dTT), ecarin clotting time (ECT) and activated partial thromboplastin time (aPTT) may provide useful information, but the tests are not standardised, and results should be interpreted with caution (see section 5.1).

Table 2 shows coagulation test thresholds at trough that may be associated with an increased risk of bleeding (see section 5.1).

Table 2: Coagulation test thresholds at trough that may be associated with an increased risk of bleeding.

Test (trough value)	Indication
	SPAF and DVT/PE
dTT [ng/mL]	> 200
ECT [x-fold upper limit of normal]	> 3
aPTT [x-fold upper limit of normal]	> 2
INR	Should not be performed

Patients who develop acute renal failure must discontinue Pradaxa (see section 4.3).

Limited data is available in patients < 50 kg (see section 5.2).

When severe bleedings occur treatment must be discontinued and the source of bleeding investigated (see section 4.9).

Medicinal products that may enhance the risk of haemorrhage should not be administered concomitantly or should be administered with caution with Pradaxa (see section 4.5).

#### Use of fibrinolytic medicinal products for the treatment of acute ischemic stroke

The use of fibrinolytic medicinal products for the treatment of acute ischemic stroke may be considered if the patient presents with a dTT, ECT or aPTT not exceeding the ULN according to the local reference range.

#### Interaction with P-gp inducers

Concomitant administration of P-gp inducers (such as rifampicin, St. John`s wort (*Hypericum perforatum*), carbamazepine, or phenytoin) is expected to result in decreased dabigatran plasma concentrations, and should be avoided (see sections 4.5 and 5.2).

#### Surgery and interventions

Patients on dabigatran etexilate who undergo surgery or invasive procedures are at increased risk for bleeding. Therefore surgical interventions may require the temporary discontinuation of dabigatran etexilate.

Caution should be exercised when treatment is temporarily discontinued for interventions and anticoagulant monitoring is warranted. Clearance of dabigatran in patients with renal insufficiency may take longer (see section 5.2). This should be considered in advance of any procedures. In such cases a coagulation test (see sections 4.4 and 5.1) may help to determine whether haemostasis is still impaired.

#### *Emergency surgery or urgent procedures*

Dabigatran etexilate should be temporarily discontinued. When rapid reversal of the anticoagulation effect is required the specific reversal agent (Praxbind, idarucizumab) to Pradaxa is available.

Reversing dabigatran therapy exposes patients to the thrombotic risk of their underlying disease. Pradaxa treatment can be re-initiated 24 hours after administration of Praxabind (idarucizumab), if the patient is clinically stable and adequate haemostasis has been achieved.

### Subacute surgery/interventions

Dabigatran etexilate should be temporarily discontinued. A surgery / intervention should be delayed if possible until at least 12 hours after the last dose. If surgery cannot be delayed the risk of bleeding may be increased. This risk of bleeding should be weighed against the urgency of intervention (for cardioversion see section 4.2).

### Elective surgery

If possible, Pradaxa should be discontinued at least 24 hours before invasive or surgical procedures. In patients at higher risk of bleeding or in major surgery where complete haemostasis may be required consider stopping Pradaxa 2-4 days before surgery. Clearance of dabigatran in patients with renal insufficiency may take longer. This should be considered in advance of any procedures.

Table 3 summarises discontinuation rules before invasive or surgical procedures.

Table 3: Discontinuation rules before invasive or surgical procedures

Renal function (CrCL in mL/min)	Estimated half-life (hours)	Stop dabigatran before elective surgery	
		High risk of bleeding or major surgery	Standard risk
≥ 80	~ 13	2 days before	24 hours before
≥ 50-< 80	~ 15	2-3 days before	1-2 days before
≥ 30-< 50	~ 18	4 days before	2-3 days before (> 48 hours)

### Spinal anaesthesia/epidural anaesthesia/lumbar puncture

Procedures such as spinal anaesthesia may require complete haemostatic function.

The risk of spinal or epidural haematoma may be increased in cases of traumatic or repeated puncture and by the prolonged use of epidural catheters. After removal of a catheter, an interval of at least 2 hours should elapse before the administration of the first dose of dabigatran etexilate. These patients require frequent observation for neurological signs and symptoms of spinal or epidural haematoma.

### Postoperative phase

Dabigatran etexilate should be restarted after the invasive procedure or surgical intervention as soon as possible provided the clinical situation allows and adequate haemostasis has been established.

Patients at risk for bleeding or patients at risk of overexposure, notably patients with moderate renal impairment (CrCL 30-50 mL/min), should be treated with caution (see sections 4.4 and 5.1).

### Patients at high surgical mortality risk and with intrinsic risk factors for thromboembolic events

There are limited efficacy and safety data for dabigatran available in these patients and therefore they should be treated with caution.

### Myocardial Infarction (SPAF)

In the phase III study RE-LY (see section 5.1.) the overall rate of myocardial infarction (MI) was 0.82, 0.81, and 0.64 % / year for dabigatran etexilate 110 mg twice daily, dabigatran etexilate 150 mg twice daily and warfarin, respectively, an increase in relative risk for dabigatran of 29 % and 27 % compared to warfarin. Irrespective of therapy, the highest absolute risk of MI was seen in the following subgroups, with similar relative risk: patients with previous MI, patients ≥ 65 years with either diabetes or coronary artery disease, patients with left ventricular ejection fraction < 40 %, and patients with moderate renal dysfunction. Furthermore a higher risk of MI was seen in patients concomitantly taking ASA plus clopidogrel or clopidogrel alone.

### Myocardial Infarction (DVT/PE)

In the three active controlled studies, a higher rate of MI was reported in patients who received dabigatran etexilate than in those who received warfarin: 0.4% vs. 0.2% in the short-term RE-COVER and RE-COVER II studies; and 0.8% vs. 0.1% in the long-term RE-MEDY trial. The increase was statistically significant in this study ( $p=0.022$ ).

In the RE-SONATE study, which compared dabigatran etexilate to placebo, the rate of MI was 0.1% for patients who received dabigatran etexilate and 0.2% for patients who received placebo

### Active Cancer Patients (DVT/PE)

The efficacy and safety have not been established for DVT/PE patients with active cancer.

## **4.5 Interaction with other medicinal products and other forms of interaction**

### Anticoagulants and antiplatelet aggregation medicinal products

There is no or only limited experience with the following treatments which may increase the risk of bleeding when used concomitantly with Pradaxa: anticoagulants such as unfractionated heparin (UFH), low molecular weight heparins (LMWH), and heparin derivatives (fondaparinux, desirudin), thrombolytic medicinal products, and vitamin K antagonists, rivaroxaban or other oral anticoagulants (see section 4.3), and platelet aggregation medicinal products such as GPIIb/IIIa receptor antagonists, ticlopidine, prasugrel, ticagrelor, dextran, and sulfinpyrazone (see section 4.4).

From the limited data collected in the phase III study RE LY in patients with atrial fibrillation it was observed that the concomitant use of other oral or parenteral anticoagulants increases major bleeding rates with both dabigatran etexilate and warfarin by approximately 2.5-fold, mainly related to situations when switching from one anticoagulant to another (see section 4.3).

UFH can be administered at doses necessary to maintain a patent central venous or arterial catheter (see sections 4.3).

From the data collected in the phase III study RE-LY in patients with atrial fibrillation (see section 5.1), it was observed that the concomitant use of antiplatelets ASA or clopidogrel approximately doubles major bleeding rates with both dabigatran etexilate and warfarin (see section 4.4).

Clopidogrel: In a phase I study in young healthy male volunteers, the concomitant administration of dabigatran etexilate and clopidogrel resulted in no further prolongation of capillary bleeding times compared to clopidogrel monotherapy. In addition, dabigatran  $AUC_{\tau,ss}$  and  $C_{max,ss}$  and the coagulation measures for dabigatran effect or the inhibition of platelet aggregation as measure of clopidogrel effect remained essentially unchanged comparing combined treatment and the respective mono-treatments. With a loading dose of 300 mg or 600 mg clopidogrel, dabigatran  $AUC_{\tau,ss}$  and  $C_{max,ss}$  were increased by about 30-40 % (see section 4.4) (see also subsection on ASA below).

ASA: The effect of concomitant administration of dabigatran etexilate and ASA on the risk of bleeds was studied in patients with atrial fibrillation in a phase II study in which a randomized ASA co-administration was applied. Based on logistic regression analysis, co-administration of ASA and 150 mg dabigatran etexilate twice daily may increase the risk for any bleeding from 12 % to 18 % and 24 % with 81 mg and 325 mg ASA, respectively (see section 4.4).

NSAIDs: NSAIDs given for short-term perioperative analgesia have been shown not to be associated with increased bleeding risk when given in conjunction with dabigatran etexilate. With chronic use in the RE-LY study, NSAIDs increased the risk of bleeding by approximately 50% on both dabigatran etexilate and warfarin. Therefore, due to the risk of haemorrhage, notably with NSAIDs with

elimination half-lives > 12 hours, close observation for signs of bleeding is recommended (see section 4.4).

LMWH: The concomitant use of LMWHs, such as enoxaparin and dabigatran etexilate has not been specifically investigated. After switching from 3-day treatment of once daily 40 mg enoxaparin s.c., 24 hours after the last dose of enoxaparin the exposure to dabigatran was slightly lower than that after administration of dabigatran etexilate (single dose of 220 mg) alone. A higher anti-FXa/FIIa activity was observed after dabigatran etexilate administration with enoxaparin pre-treatment compared to that after treatment with dabigatran etexilate alone. This is considered to be due to the carry-over effect of enoxaparin treatment, and regarded as not clinically relevant. Other dabigatran related anti-coagulation tests were not changed significantly by the pre-treatment of enoxaparin.

#### Interactions linked to dabigatran etexilate and dabigatran metabolic profile

Dabigatran etexilate and dabigatran are not metabolised by the cytochrome P450 system and have no *in vitro* effects on human cytochrome P450 enzymes. Therefore, related medicinal product interactions are not expected with dabigatran.

#### Transporter interactions

##### *P-gp inhibitors*

Dabigatran etexilate is a substrate for the efflux transporter P-gp. Concomitant administration of P-gp inhibitors (such as amiodarone, verapamil, quinidine, ketoconazole, dronedarone, clarithromycin and ticagrelor) is expected to result in increased dabigatran plasma concentrations.

If not otherwise specifically described, close clinical surveillance (looking for signs of bleeding or anaemia) is required when dabigatran is co-administered with strong P-gp inhibitors. A coagulation test helps to identify patients with an increased bleeding risk due to increased dabigatran exposure (see sections 4.2, 4.4 and 5.1).

The following strong P-gp inhibitors are contraindicated: systemic ketoconazole, cyclosporine, itraconazole and dronedarone (see section 4.3). Concomitant treatment with tacrolimus is not recommended. Caution should be exercised with mild to moderate P-gp inhibitors (e.g. amiodarone, posaconazole, quinidine, verapamil and ticagrelor) (see sections 4.2 and 4.4).

Ketoconazole: Ketoconazole increased total dabigatran AUC<sub>0-∞</sub> and C<sub>max</sub> values by 138 % and 135 %, respectively, after a single oral dose of 400 mg, and 153 % and 149 %, respectively, after multiple oral dosing of 400 mg ketoconazole once daily. The time to peak, terminal half-life and mean residence time were not affected by ketoconazole (see section 4.4). Concomitant treatment with systemic ketoconazole is contraindicated (see section 4.3).

Dronedarone: When dabigatran etexilate and dronedarone were given at the same time total dabigatran AUC<sub>0-∞</sub> and C<sub>max</sub> values increased by about 2.4-fold and 2.3-fold (+136 % and 125 %), respectively, after multiple dosing of 400 mg dronedarone bid, and about 2.1-fold and 1.9-fold (+114 % and 87 %), respectively, after a single dose of 400 mg. The terminal half-life and renal clearance of dabigatran were not affected by dronedarone. When single and multiple doses of dronedarone were given 2 h after dabigatran etexilate, the increases in dabigatran AUC<sub>0-∞</sub> were 1.3-fold and 1.6-fold, respectively. Concomitant treatment with dronedarone is contraindicated.

Amiodarone: When Pradaxa was co-administered with a single oral dose of 600 mg amiodarone, the extent and rate of absorption of amiodarone and its active metabolite DEA were essentially unchanged. The dabigatran AUC and C<sub>max</sub> were increased by about 60 % and 50 %, respectively. The mechanism of the interaction has not been completely clarified. In view of the long half-life of amiodarone the potential for drug interaction may exist for weeks after discontinuation of amiodarone (see sections 4.2 and 4.4). Close clinical surveillance is recommended when dabigatran etexilate is

combined with amiodarone and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

**Quinidine:** Quinidine was given as 200 mg dose every 2nd hour up to a total dose of 1,000 mg. Dabigatran etexilate was given twice daily over 3 consecutive days, on the 3<sup>rd</sup> day either with or without quinidine. Dabigatran AUC<sub>τ,ss</sub> and C<sub>max,ss</sub> were increased on average by 53 % and 56 %, respectively with concomitant quinidine (see sections 4.2 and 4.4). Close clinical surveillance is recommended when dabigatran etexilate is combined with quinidine and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

**Verapamil:** When dabigatran etexilate (150 mg) was co-administered with oral verapamil, the C<sub>max</sub> and AUC of dabigatran were increased but magnitude of this change differs depending on timing of administration and formulation of verapamil (see sections 4.2 and 4.4).

The greatest elevation of dabigatran exposure was observed with the first dose of an immediate release formulation of verapamil administered one hour prior to dabigatran etexilate intake (increase of C<sub>max</sub> by about 180 % and AUC by about 150 %). The effect was progressively decreased with administration of an extended release formulation (increased of C<sub>max</sub> by about 90 % and AUC by about 70 %) or administration of multiple doses of verapamil (increased of C<sub>max</sub> by about 60 % and AUC by about 50 %).

Patients concomitantly receiving dabigatran etexilate and verapamil, the dose of Pradaxa should be reduced to 220 mg taken as one 110 mg capsule twice daily (see section 4.2). Close clinical surveillance is recommended when dabigatran etexilate is combined with verapamil and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

There was no meaningful interaction observed when verapamil was given 2 hours after dabigatran etexilate (increased of C<sub>max</sub> by about 10 % and AUC by about 20 %). This is explained by completed dabigatran absorption after 2 hours (see section 4.4).

**Clarithromycin:** When clarithromycin (500 mg twice daily) was administered together with dabigatran etexilate in healthy volunteers, increase of AUC by about 19 % and C<sub>max</sub> by about 15 % was observed without any clinical safety concern. However, in patients receiving dabigatran, a clinically relevant interaction cannot be excluded when combined with clarithromycin. Therefore, a close monitoring should be exercised when dabigatran etexilate is combined with clarithromycin and particularly in the occurrence of bleeding, notably in patients having a mild to moderate renal impairment.

**Ticagrelor:** When a single dose of 75mg dabigatran etexilate was coadministered simultaneously with a loading dose of 180 mg ticagrelor, the dabigatran AUC and C<sub>max</sub> were increased by 1.73-fold and 1.95-fold (+73% and 95 %), respectively. After multiplied doses of ticagrelor 90 mg b.i.d. the increase of dabigatran exposure is 1.56-fold and 1.46-fold (+56% and 46%) for C<sub>max</sub> and AUC, respectively.

Concomitant administration of a loading dose of 180 mg ticagrelor and 110 mg dabigatran etexilate (in steady state) increased the dabigatran AUC<sub>τ,ss</sub> and C<sub>max,ss</sub> by 1.49-fold and 1.65-fold (+49% and 65%), respectively, compared with dabigatran etexilate given alone. When a loading dose of 180 mg ticagrelor was given 2 hours after 110 mg dabigatran etexilate (in steady state), the increase of dabigatran AUC<sub>τ,ss</sub> and C<sub>max,ss</sub> was reduced to 1.27-fold and 1.23-fold (+27% and 23%), respectively, compared with dabigatran etexilate given alone. This staggered intake is the recommended administration for start of ticagrelor with a loading dose.

Concomitant administration of 90 mg ticagrelor BID (maintenance dose) with 110 mg dabigatran etexilate increased the adjusted dabigatran AUC<sub>τ,ss</sub> and C<sub>max,ss</sub> 1.26-fold and 1.29-fold, respectively, compared with dabigatran etexilate given alone.

The following potent P-gp inhibitors have not been clinically studied but from *in vitro* results a similar effect as with ketoconazole may be expected:

Itraconazole and cyclosporine, which are contra-indicated (see section 4.3).



Tacrolimus has been found in vitro to have a similar level of inhibitory effect on P-gp as that seen with itraconazole and cyclosporine. Dabigatran etexilate has not been clinically studied together with tacrolimus. However, limited clinical data with another P-gp substrate (everolimus) suggest that the inhibition of P-gp with tacrolimus is weaker than that observed with strong P-gp inhibitors. Based on these data concomitant treatment with tacrolimus is not recommended.

Posaconazole also inhibits P-gp to some extent but has not been clinically studied. Caution should be exercised when Pradaxa is co-administered with posaconazole.

#### *P-gp inducers*

Concomitant administration of a P-gp inducer (such as rifampicin, St. John's wort (*Hypericum perforatum*), carbamazepine, or phenytoin) is expected to result in decreased dabigatran concentrations and should be avoided (see sections 4.4 and 5.2).

Rifampicin: Pre-dosing of the probe inducer rifampicin at a dose of 600 mg once daily for 7 days decreased total dabigatran peak and total exposure by 65.5 and 67 %, respectively. The inducing effect was diminished resulting in dabigatran exposure close to the reference by day 7 after cessation of rifampicin treatment. No further increase in bioavailability was observed after another 7 days.

#### *Other medicinal products affecting P-gp*

Protease inhibitors including ritonavir and its combinations with other protease inhibitors affect P-gp (either as inhibitor or as inducer). They have not been studied and are therefore not recommended for concomitant treatment with Pradaxa.

#### *P-gp substrate*

Digoxin: In a study performed with 24 healthy subjects, when Pradaxa was co-administered with digoxin, no changes on digoxin and no clinical relevant changes on dabigatran exposure have been observed.

#### Co-medication with selective serotonin re-uptake inhibitors (SSRIs) or selective serotonin norepinephrine re-uptake inhibitors (SNRIs)

SSRIs and SNRIs increased the risk of bleeding in RE-LY in all treatment groups.

#### Gastric pH

Pantoprazole: When Pradaxa was co-administered with pantoprazole, a decrease in the dabigatran area under the plasma concentration-time curve of approximately 30 % was observed. Pantoprazole and other proton-pump inhibitors (PPI) were co-administered with Pradaxa in clinical trials, and concomitant PPI treatment did not appear to reduce the efficacy of Pradaxa.

Ranitidine: Ranitidine administration together with Pradaxa had no clinically relevant effect on the extent of absorption of dabigatran.

## **4.6 Fertility, pregnancy and lactation**

### Women of childbearing potential / Contraception in males and females

Women of childbearing potential should avoid pregnancy during treatment with dabigatran etexilate.

### Pregnancy

There are limited amount of data from the use of dabigatran etexilate in pregnant women.

Studies in animals have shown reproductive toxicity (see section 5.3). The potential risk for humans is unknown.

Pradaxa should not be used during pregnancy unless clearly necessary.

#### Breast-feeding

There are no clinical data of the effect of dabigatran on infants during breast-feeding. Breast-feeding should be discontinued during treatment with Pradaxa.

#### Fertility

No human data available.

In animal studies an effect on female fertility was observed in the form of a decrease in implantations and an increase in pre-implantation loss at 70 mg/kg (representing a 5-fold higher plasma exposure level compared to patients). No other effects on female fertility were observed. There was no influence on male fertility. At doses that were toxic to the mothers (representing a 5- to 10-fold higher plasma exposure level to patients), a decrease in foetal body weight and embryofoetal viability along with an increase in foetal variations were observed in rats and rabbits. In the pre- and post-natal study, an increase in foetal mortality was observed at doses that were toxic to the dams (a dose corresponding to a plasma exposure level 4-fold higher than observed in patients).

#### **4.7 Effects on ability to drive and use machines**

Pradaxa has no or negligible influence on the ability to drive and use machines.

#### **4.8 Undesirable effects**

##### Summary of the safety profile

In the pivotal study investigating the prevention of stroke and SEE in patients with atrial fibrillation, a total of 12,042 patients were treated with dabigatran etexilate. Of these 6,059 were treated with 150 mg twice daily of dabigatran etexilate, while 5,983 received doses of 110 mg twice daily.

In the 2 active controlled DVT/PE treatment trials, RE-COVER and RE-COVER II, a total of 2,553 patients were included in the safety analysis for dabigatran etexilate. All patients received doses of 150 mg twice daily of dabigatran etexilate. Adverse drug reactions for both treatments, dabigatran etexilate and warfarin, are counted from the first intake of dabigatran etexilate or warfarin after the parenteral therapy has been discontinued (oral only treatment period). This includes all adverse drug reactions which occurred during dabigatran therapy. All adverse drug reactions, which occurred during warfarin therapy, are included except for those during the overlap period between warfarin and parenteral therapy.

A total of 2,114 patients were treated in the active controlled DVT/PE prevention trial, RE-MEDY, and in the placebo-controlled DVT/PE prevention trial, RE-SONATE. All patients received doses of 150 mg twice daily of dabigatran etexilate.

In total, 22 % of patient with atrial fibrillation treated for the prevention of stroke and SEE (long-term treatment for up to 3 years) , 14 % of patients treated for DVT/PE and 15 % of patients treated for DVT/PE prevention experienced adverse reactions.

The most commonly reported adverse reactions are bleedings occurring in total in approximately 16,6 % in patients with atrial fibrillation treated long-term for the prevention of stroke and SEE and in 14,4 % of patients treated for DVT/PE. Furthermore, bleedings occurred in 19,4 % of patients in the DVT/PE prevention trial RE-MEDY and in 10,5 % of patients in the DVT/PE trial RE-SONATE.

Since the patient population treated in the three indications are not comparable and bleeding events are distributed over several System Organ Classes (SOC), a summary description of major and any bleeding are broken down by indication and are provided in tables 5, 6, 7 and 8 below.

Although low in frequency in clinical trials, major or severe bleeding may occur and, regardless of location, may lead to disabling, life-threatening or even fatal outcomes.

Tabulated list of adverse reactions

Table 4 shows the adverse reactions identified from the study in prevention of thromboembolic stroke and SEE in patients with atrial fibrillation, the studies in DVT/PE treatment and in -DVT/PE prevention. They are ranked under headings of System Organ Class (SOC) and frequency using the following convention. very common ( $\geq 1/10$ ), common ( $\geq 1/100$  to  $< 1/10$ ), uncommon ( $\geq 1/1,000$  to  $< 1/100$ ), rare ( $\geq 1/10,000$  to  $< 1/1,000$ ), very rare ( $< 1/10,000$ ), not known (cannot be estimated from the available data).

Table 4: Adverse reactions

	Stroke and SEE prevention in patients with atrial fibrillation	DVT/PE treatment and DVT/PE prevention
SOC / Preferred term.		
Blood and lymphatic system disorders		
Anaemia	Common	Uncommon
Haemoglobin decreased	Uncommon	Not known
Thrombocytopenia	Uncommon	Rare
Haematocrit decreased	Rare	Not known
Immune system disorder		
Drug hypersensitivity	Uncommon	Uncommon
Rash	Uncommon	Uncommon
Pruritus	Uncommon	Uncommon
Anaphylactic reaction	Rare	Rare
Angioedema	Rare	Rare
Urticaria	Rare	Rare
Bronchospasm	Not known	Not known
Nervous system disorders		
Intracranial haemorrhage	Uncommon	Rare
Vascular disorders		
Haematoma	Uncommon	Uncommon
Haemorrhage	Uncommon	Uncommon
Respiratory, thoracic and mediastinal disorders		
Epistaxis	Common	Common
Haemoptysis	Uncommon	Uncommon
Gastrointestinal disorders		
Gastrointestinal haemorrhage	Common	Common
Abdominal pain	Common	Uncommon
Diarrhoea	Common	Uncommon
Dyspepsia	Common	Common
Nausea	Common	Uncommon
Rectal haemorrhage	Uncommon	Common
Haemorrhoidal haemorrhage	Uncommon	Uncommon
Gastrointestinal ulcer	Uncommon	Uncommon
Gastroesophagitis	Uncommon	Uncommon
Gastroesophageal reflux disease	Uncommon	Uncommon
Vomiting	Uncommon	Uncommon

Dysphagia	Uncommon	Rare
Hepatobiliary disorders		
Hepatic function abnormal/ Liver function Test abnormal	Uncommon	Uncommon
Alanine aminotransferase increased	Uncommon	Uncommon
Aspartate aminotransferase increased	Uncommon	Uncommon
Hepatic enzyme increased	Rare	Uncommon
Hyperbilirubinaemia	Rare	Not known
Skin and subcutaneous tissue disorder		
Skin haemorrhage	Common	Common
Musculoskeletal and connective tissue disorders		
Haemarthrosis	Rare	Uncommon
Renal and urinary disorders		
Genitourological haemorrhage, including haematuria	Common	Common
General disorders and administration site conditions		
Injection site haemorrhage	Rare	Rare
Catheter site haemorrhage	Rare	Rare
Injury, poisoning and procedural complications		
Traumatic haemorrhage	Rare	Uncommon
Incision site haemorrhage	Rare	Rare

### Bleeding

Prevention of stroke and SEE in adult patients with nonvalvular atrial fibrillation with one or more risk factors (SPAF)

The table 5 shows bleeding events broken down to major and any bleeding in the pivotal study testing the prevention of thromboembolic stroke and SEE in patients with atrial fibrillation.

Table 5: Bleeding events in a study testing the prevention of thromboembolic stroke and SEE in patients with atrial fibrillation

	Dabigatran etexilate 110 mg twice daily	Dabigatran etexilate 150 mg twice daily	Warfarin
Subjects randomized	6,015	6,076	6,022
Major bleeding	347 (2.92 %)	409 (3.40 %)	426 (3.61 %)
Intracranial bleeding	27 (0.23 %)	39 (0.32 %)	91 (0.77 %)
GI bleeding	134 (1.13 %)	192 (1.60 %)	128 (1.09 %)
Fatal bleeding	26 (0.22 %)	30 (0.25 %)	42 (0.36 %)
Minor bleeding	1,566 (13.16 %)	1,787 (14.85 %)	1,931 (16.37 %)
Any bleeding	1,759 (14.78 %)	1,997 (16.60 %)	2,169 (18.39 %)

Major bleeding was defined to fulfil one or more of the following criteria:

Bleeding associated with a reduction in haemoglobin of at least 20 g/L or leading to a transfusion of at least 2 units of blood or packed cells.

Symptomatic bleeding in a critical area or organ: intraocular, intracranial, intraspinal or intramuscular with compartment syndrome, retroperitoneal bleeding, intra-articular bleeding or pericardial bleeding.

Major bleeds were classified as life-threatening if they fulfilled one or more of the following criteria:

Fatal bleed; symptomatic intracranial bleed; reduction in haemoglobin of at least 50 g/L; transfusion of at least 4 units of blood or packed cells; a bleed associated with hypotension requiring the use of intravenous inotropic medicinal products; a bleed that necessitated surgical intervention.

Subjects randomized to dabigatran etexilate 110 mg twice daily or 150 mg twice daily had a significantly lower risk for life-threatening bleeds and intracranial bleeding compared to warfarin [ $p < 0.05$ ]. Both dose strengths of dabigatran etexilate had also a statistically significant lower total bleed rate. Subjects randomized to dabigatran etexilate 110 mg twice daily had a significantly lower risk for major bleeds compared with warfarin (hazard ratio 0.81 [ $p=0.0027$ ]). Subjects randomized to dabigatran etexilate 150 mg twice daily had a significantly higher risk for major GI bleeds compared with warfarin (hazard ratio 1.48 [ $p=0.0005$ ]). This effect was seen primarily in patients  $\geq 75$  years. The clinical benefit of dabigatran with regard to stroke and SEE prevention and decreased risk of ICH compared to warfarin is preserved across individual subgroups, e.g. renal impairment, age, concomitant medication use such as anti-platelets or P-gp inhibitors. While certain patient subgroups are at an increased risk of major bleeding when treated with an anticoagulant, the excess bleeding risk for dabigatran is due to GI bleeding, typically seen within the first 3-6 months following initiation of dabigatran etexilate therapy.

#### Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE), and prevention of recurrent DVT and PE in adults (DVT/PE) treatment

Table 6 shows bleeding events in the pooled pivotal studies RE-COVER and RE-COVER II testing the treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE). In the pooled studies the primary safety endpoints of major bleeding, major or clinically relevant bleeding and any bleeding were significantly lower than warfarin at a nominal alpha level of 5 %.

Table 6: Bleeding events in the studies RE-COVER and RE-COVER II testing the treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE)

	Dabigatran etexilate 150 mg twice daily	Warfarin	Hazard ratio vs. warfarin (95% confidence interval)
Patients included in safety analysis	2,456	2,462	
Major bleeding events	24 (1.0 %)	40 (1.6 %)	0.60 (0.36, 0.99)
Intracranial Bleeding	2 (0.1 %)	4 (0.2 %)	0.50 (0.09, 2.74)
Major GI bleeding	10 (0.4 %)	12 (0.5 %)	0.83 (0.36, 1.93)
Life-threatening bleed	4 (0.2 %)	6 (0.2 %)	0.66 (0.19, 2.36)
Major bleeding events/clinically relevant bleeds	109 (4.4 %)	189 (7.7 %)	0.56 (0.45, 0.71)
Any bleeding	354 (14.4 %)	503 (20.4 %)	0.67 (0.59, 0.77)
Any GI bleeding	70 (2.9 %)	55 (2.2 %)	1.27 (0.90, 1.82)

Bleeding events for both treatments are counted from the first intake of dabigatran etexilate or warfarin after the parenteral therapy has been discontinued (oral only treatment period). This includes all bleeding events, which occurred during dabigatran etexilate therapy. All bleeding events which occurred during warfarin therapy are included except for those during the overlap period between warfarin and parenteral therapy.

The definition of major bleeding events (MBEs) followed the recommendations of the International Society on Thrombosis and Haemostasis. A bleeding event was categorised as an MBE if it fulfilled at least one of the following criteria:

- Fatal bleeding
- Symptomatic bleeding in a critical area or organ, such as intracranial, intraspinal, intraocular, retroperitoneal, intra-articular, or pericardial, or intramuscular with compartment syndrome. In order for bleeding in a critical area or organ to be classified as a MBE it had to be associated with a symptomatic clinical presentation
- Bleeding causing a fall in haemoglobin level of 20 g/L (1.24 mmol/L) or more, or leading to transfusion of 2 or more units of whole blood or red cells

Table 7 shows bleeding events in pivotal study RE-MEDY testing prevention of deep vein thrombosis (DVT) and pulmonary embolism (PE). Some bleeding events (MBEs/CRBEs; any bleeding) were significantly lower at a nominal alpha level of 5% in patients receiving dabigatran etexilate as compared with those receiving warfarin.

Table 7: Bleeding events in study RE-MEDY testing prevention of deep vein thrombosis (DVT) and pulmonary embolism (PE)

	Dabigatran etexilate 150 mg twice daily	Warfarin	Hazard ratio vs warfarin (95% Confidence Interval)
Treated patients	1,430	1,426	
Major bleeding events	13 (0.9 %)	25 (1.8 %)	0.54 (0.25, 1.16)
Intracranial bleeding	2 (0.1 %)	4 (0.3 %)	Not calculable*
Major GI bleeding	4 (0.3%)	8 (0.5%)	Not calculable*
Life-threatening bleed	1 (0.1 %)	3 (0.2 %))	Not calculable*
Major bleeding event /clinically relevant bleeds	80 (5.6 %)	145 (10.2 %)	0.55 ( 0.41, 0.72)
Any bleeding	278 (19.4 %)	373 (26.2 %)	0.71 (0.61, 0.83)
Any GI bleeds	45 (3.1%)	32 (2.2%)	1.39 (0.87, 2.20)

\*HR not estimable as there is no event in either one cohort/treatment

The definition of MBEs followed the recommendations of the International Society on Thrombosis and Haemostasis as described under RE-COVER and RE-COVER II.

Table 8 shows bleeding events in pivotal study RE-SONATE testing prevention of deep vein thrombosis (DVT) and pulmonary embolism (PE). The rate of the combination of MBEs/CRBEs and the rate of any bleeding was significantly lower at a nominal alpha level of 5 % in patients receiving placebo as compared with those receiving dabigatran etexilate.

Table 8: Bleeding events in study RE-SONATE testing prevention of deep vein thrombosis (DVT) and pulmonary embolism (PE)

	Dabigatran etexilate 150 mg twice daily	Placebo	Hazard ratio vs placebo (95% confidence interval)
Treated patients	684	659	
Major bleeding events	(0.3 %)	0	Not calculable*
Intracranial bleeding	0	0	Not calculable*
Major GI bleeding	2 (0.3%)	0	Not calculable*
Life-threatening bleeds	0	0	Not calculable*
Major bleeding event/clinical relevant bleeds	36 (5.3 %)	13 (2.0 %)	2.69 (1.43, 5.07)
Any bleeding	72 (10.5 %)	40 (6.1 %)	1.77 (1.20, 2.61)
Any GI bleeds	5 (0.7%)	2 (0.3%)	2.38 (0.46, 12.27)

\*HR not estimable as there is no event in either one treatment

The definition of MBEs followed the recommendations of the International Society on Thrombosis and Haemostasis as described under RE-COVER and RE-COVER II.

### Myocardial infarction

#### Prevention of stroke and SEE in adult patients with nonvalvular atrial fibrillation with one or more risk factors (SPAF)

In the RE-LY study, in comparison to warfarin the annual myocardial infarction rate for dabigatran etexilate was increased from 0.64 % (warfarin) to 0.82 % (dabigatran etexilate 110 mg twice daily) / 0.81 % (dabigatran etexilate 150 mg twice daily) (see section 5.1).

#### Treatment of DVT and PE, and prevention of recurrent DVT and PE in adults (DVT/PE)

In the three active controlled studies, a higher rate of MI was reported in patients who received dabigatran etexilate than in those who received warfarin: 0.4% vs. 0.2% in the short-term RECOVER and RECOVER II studies; and 0.8% vs. 0.1% in the long-term RE-MEDY trial. The increase was statistically significant in this study (p=0.022).

In the RE-SONATE study, which compared dabigatran etexilate to placebo, the rate of MI was 0.1 % for patients who received dabigatran etexilate and 0.2 % for patients who received placebo (see section 4.4.).

#### Paediatric population (DVT/PE)

In the clinical study 1160.88 in total, 9 adolescent patients (age 12 to < 18 years) with diagnosis of primary VTE received an initial oral dose of dabigatran etexilate of 1.71 ( $\pm$  10 %) mg/kg bodyweight. Based on dabigatran concentrations as determined by the diluted thrombin time test and clinical assessment, the dose was adjusted to the target dose of 2.14 ( $\pm$  10%) mg/kg bodyweight of dabigatran etexilate. On treatment 2 (22.1 %) patients experienced mild related adverse events (gastroesophageal reflux / abdominal pain; abdominal discomfort) and 1 (11.1 %) patient experienced a not related serious adverse event (recurrent VTE of the leg) in the post treatment period > 3 days after stop of dabigatran etexilate.

### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system listed in Appendix V.

## **4.9 Overdose**

Doses of dabigatran etexilate beyond those recommended, expose the patient to increased risk of bleeding.

In case of an overdose suspicion, coagulation tests can help to determine a bleeding risk (see sections 4.4 and 5.1). A calibrated quantitative (dTT) test or repetitive dTT measurements allow prediction of the time by when certain dabigatran levels will be reached (see section 5.1), also in case additional measures e.g. dialysis have been initiated.

Excessive anticoagulation may require interruption of Pradaxa treatment. In the event of haemorrhagic complications, treatment must be discontinued and the source of bleeding investigated. Since dabigatran is excreted predominantly by the renal route adequate diuresis must be maintained. Depending on the clinical situation appropriate supportive treatment, such as surgical haemostasis and blood volume replacement, should be undertaken at the prescribers discretion.

For situations when rapid reversal of the anticoagulant effects of Pradaxa is required the specific reversal agent (Praxbind, idarucizumab) antagonizing the pharmacodynamics effect of Pradaxa is available (see section 4.4).

Coagulation factor concentrates (activated or non-activated) or recombinant Factor VIIa may be taken into account. There is some experimental evidence to support the role of these medicinal products in reversing the anticoagulant effect of dabigatran, but data on their usefulness in clinical settings and also on the possible risk of rebound thromboembolism is very limited. Coagulation tests may become unreliable following administration of suggested coagulation factor concentrates. Caution should be exercised when interpreting these tests. Consideration should also be given to administration of platelet concentrates in cases where thrombocytopenia is present or long acting antiplatelet drugs have been used. All symptomatic treatment should be given according to the physician's judgement.

Depending on local availability, a consultation of a coagulation expert should be considered in case of major bleedings.

As protein binding is low, dabigatran can be dialysed; there is limited clinical experience to demonstrate the utility of this approach in clinical studies (see section 5.2).

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: antithrombotic, direct thrombin inhibitors, ATC code: B01AE07.

#### Mechanism of action

Dabigatran etexilate is a small molecule prodrug which does not exhibit any pharmacological activity. After oral administration, dabigatran etexilate is rapidly absorbed and converted to dabigatran by esterase-catalysed hydrolysis in plasma and in the liver. Dabigatran is a potent, competitive, reversible direct thrombin inhibitor and is the main active principle in plasma.

Since thrombin (serine protease) enables the conversion of fibrinogen into fibrin during the coagulation cascade, its inhibition prevents the development of thrombus. Dabigatran also inhibits free thrombin, fibrin-bound thrombin and thrombin-induced platelet aggregation.



## Pharmacodynamic effects

*In-vivo* and *ex-vivo* animal studies have demonstrated antithrombotic efficacy and anticoagulant activity of dabigatran after intravenous administration and of dabigatran etexilate after oral administration in various animal models of thrombosis.

There is a clear correlation between plasma dabigatran concentration and degree of anticoagulant effect based on phase II studies. Dabigatran prolongs the thrombin time (TT), ECT, and aPTT.

The calibrated quantitative diluted TT (dTT) test provides an estimation of dabigatran plasma concentration that can be compared to the expected dabigatran plasma concentrations. When the calibrated dTT assay delivers a dabigatran plasma concentration result at or below the limit of quantification, an additional coagulation assay such as TT, ECT or aPTT should be considered.

The ECT can provide a direct measure of the activity of direct thrombin inhibitors.

The aPTT test is widely available and provides an approximate indication of the anticoagulation intensity achieved with dabigatran. However, the aPTT test has limited sensitivity and is not suitable for precise quantification of anticoagulant effect, especially at high plasma concentrations of dabigatran. Although high aPTT values should be interpreted with caution, a high aPTT value indicates that the patient is anticoagulated.

In general, it can be assumed that these measures of anti-coagulant activity may reflect dabigatran levels and can provide guidance for the assessment of bleeding risk, i.e. exceeding the 90<sup>th</sup> percentile of dabigatran trough levels or a coagulation assay such as aPTT measured at trough (for aPTT thresholds see section 4.4, table 2) is considered to be associated with an increased risk of bleeding.

Steady state geometric mean dabigatran peak plasma concentration, measured around 2 hours after 150 mg dabigatran etexilate administration twice daily, was 175 ng/mL, with a range of 117-275 ng/mL (25<sup>th</sup>-75<sup>th</sup> percentile range). The dabigatran geometric mean trough concentration, measured at trough in the morning, at the end of the dosing interval (i.e. 12 hours after the 150 mg dabigatran evening dose), was on average 91.0 ng/mL, with a range of 61.0-143 ng/mL (25<sup>th</sup>-75<sup>th</sup> percentile range).

For patients with NVAf treated for prevention of stroke and SEE with 150 mg dabigatran etexilate twice daily,

- the 90<sup>th</sup> percentile of dabigatran plasma concentrations measured at trough (10-16 hours after the previous dose) was about 200 ng/mL,
- an ECT at trough (10-16 hours after the previous dose), elevated approximately 3-fold upper limit of normal refers to the observed 90<sup>th</sup> percentile of ECT prolongation of 103 seconds,
- an aPTT ratio greater than 2-fold upper limit of normal (aPTT prolongation of about 80 seconds), at trough (10-16 hours after the previous dose) reflects the 90<sup>th</sup> percentile of observations.

In patients treated for DVT and PE with 150 mg dabigatran etexilate twice daily, the dabigatran geometric mean trough concentration, measured within 10–16 hours after dose, at the end of the dosing interval (i.e. 12 hours after the 150 mg dabigatran evening dose), was 59.7 ng/ml, with a range of 38.6 - 94.5 ng/ml (25<sup>th</sup>-75<sup>th</sup> percentile range). For treatment of DVT and PE, with dabigatran etexilate 150 mg twice daily,

- the 90<sup>th</sup> percentile of dabigatran plasma concentrations measured at trough (10-16 hours after the previous dose) was about 146 ng/ml,
- an ECT at trough (10-16 hours after the previous dose), elevated approximately 2.3-fold compared to baseline refers to the observed 90<sup>th</sup> percentile of ECT prolongation of 74 seconds,
- the 90<sup>th</sup> percentile of aPTT at trough (10-16 hours after the previous dose) was 62 seconds, which would be 1.8-fold compared to baseline.

In patients treated for prevention of recurrent of DVT and PE with 150 mg dabigatran etexilate twice daily no pharmacokinetic data are available.

Clinical efficacy and safety (SPAF)

*Prevention of stroke and SEE in adult patients with NVAf with one or more risk factors*

The clinical evidence for the efficacy of dabigatran etexilate is derived from the RE-LY study (Randomized Evaluation of Long –term anticoagulant therapy) a multi-centre, multi-national, randomized parallel group study of two blinded doses of dabigatran etexilate (110 mg and 150 mg twice daily) compared to open-label warfarin in patients with atrial fibrillation at moderate to high risk of stroke and SEE. The primary objective in this study was to determine if dabigatran etexilate was non-inferior to warfarin in reducing the occurrence of the composite endpoint stroke and SEE. Statistical superiority was also analyzed.

In the RE-LY study, a total of 18,113 patients were randomized, with a mean age of 71.5 years and a mean CHADS<sub>2</sub> score of 2.1. The patient population was 64 % male, 70 % Caucasian and 16 % Asian. For patients randomized to warfarin, the mean percentage within time in therapeutic range (TTR) (INR 2-3) was 64.4 % (median TTR 67 %).

The RE-LY study demonstrated that dabigatran etexilate, at a dose of 110 mg twice daily, is non-inferior to warfarin in the prevention of stroke and SEE in subjects with atrial fibrillation, with a reduced risk of ICH, total bleeding and major bleeding. The dose of 150 mg twice daily, reduces significantly the risk of ischemic and haemorrhagic stroke, vascular death, ICH and total bleeding compared to warfarin. Major bleeding rates with this dose were comparable to warfarin. Myocardial infarction rates were slightly increased with dabigatran etexilate 110 mg twice daily and 150 mg twice daily compared to warfarin (hazard ratio 1.29; p=0.0929 and hazard ratio 1.27; p=0.1240, respectively). With improving monitoring of INR the observed benefits of dabigatran etexilate compared to warfarin diminish.

Tables 9-11 display details of key results in the overall population:

Table 9: Analysis of first occurrence of stroke or SEE (primary endpoint) during the study period in RE-LY.

	Dabigatran etexilate 110 mg twice daily	Dabigatran etexilate 150 mg twice daily	Warfarin
Subjects randomized	6,015	6,076	6,022
Stroke and/or SEE			
Incidences (%)	183 (1.54)	135 (1.12)	203 (1.72)
Hazard ratio over warfarin (95 % CI)	0.89 (0.73, 1.09)	0.65 (0.52, 0.81)	
p value superiority	p=0.2721	p=0.0001	

% refers to yearly event rate

Table 10: Analysis of first occurrence of ischemic or haemorrhagic strokes during the study period in RE-LY.

	Dabigatran etexilate 110 mg twice daily	Dabigatran etexilate 150 mg twice daily	Warfarin
Subjects randomized	6,015	6,076	6,022
Stroke			
Incidences (%)	171 (1.44)	123 (1.02)	187 (1.59)
Hazard ratio vs. warfarin (95 % CI)	0.91 (0.74, 1.12)	0.64 (0.51, 0.81)	
p-value	0.3553	0.0001	
SEE			
Incidences (%)	15 (0.13)	13 (0.11)	21 (0.18)
Hazard ratio vs. warfarin (95 % CI)	0.71 (0.37, 1.38)	0.61 (0.30, 1.21)	
p-value	0.3099	0.1582	
Ischemic stroke			
Incidences (%)	152 (1.28)	104 (0.86)	134 (1.14)
Hazard ratio vs. warfarin (95 % CI)	1.13 (0.89, 1.42)	0.76 (0.59, 0.98)	
p-value	0.3138	0.0351	
Haemorrhagic stroke			
Incidences (%)	14 (0.12)	12 (0.10)	45 (0.38)
Hazard ratio vs. warfarin (95 % CI)	0.31 (0.17, 0.56)	0.26 (0.14, 0.49)	
p-value	0.0001	< 0.0001	

% refers to yearly event rate

Table 11: Analysis of all cause and cardiovascular survival during the study period in RE-LY.

	Dabigatran etexilate 110 mg twice daily	Dabigatran etexilate 150 mg twice daily	Warfarin
Subjects randomized	6,015	6,076	6,022
All-cause mortality			
Incidences (%)	446 (3.75)	438 (3.64)	487 (4.13)
Hazard ratio vs. warfarin (95 % CI)	0.91 (0.80, 1.03)	0.88 (0.77, 1.00)	
p-value	0.1308	0.0517	
Vascular mortality			
Incidences (%)	289 (2.43)	274 (2.28)	317 (2.69)
Hazard ratio vs. warfarin (95 % CI)	0.90 (0.77, 1.06)	0.85 (0.72, 0.99)	
p-value	0.2081	0.0430	

% refers to yearly event rate

Tables 12-13 display results of the primary efficacy and safety endpoint in relevant sub-populations:

For the primary endpoint, stroke and SEE, no subgroups (i.e., age, weight, gender, renal function, ethnicity, etc.) were identified with a different risk ratio compared to warfarin.

Table 12: Hazard Ratio and 95 % CI for stroke/SEE by subgroups

Endpoint	Dabigatran etexilate 110 mg twice daily vs. warfarin	Dabigatran etexilate 150 mg twice daily vs. warfarin
Age (years)		
< 65	1.10 (0.64, 1.87)	0.51 (0.26, 0.98)
65 ≤ and < 75	0.86 (0.62, 1.19)	0.67 (0.47, 0.95)
≥ 75	0.88 (0.66, 1.17)	0.68 (0.50, 0.92)
≥ 80	0.68 (0.44, 1.05)	0.67 (0.44, 1.02)
CrCL(mL/min)		
30 ≤ and < 50	0.89 (0.61, 1.31)	0.48 (0.31, 0.76)
50 ≤ and < 80	0.91 (0.68, 1.20)	0.65 (0.47, 0.88)
≥ 80	0.81 (0.51, 1.28)	0.69 (0.43, 1.12)

For the primary safety endpoint of major bleeding there was an interaction of treatment effect and age. The relative risk of bleeding with dabigatran compared to warfarin increased with age. Relative risk was highest in patients ≥ 75 years. The concomitant use of antiplatelets ASA or clopidogrel approximately doubles MBE rates with both dabigatran and warfarin. There was no significant interaction of treatment effects with the subgroups of renal function and CHADS<sub>2</sub> score.

Table 13: Hazard Ratio and 95 % CI for major bleeds by subgroups

Endpoint	Dabigatran etexilate 110 mg twice daily vs. warfarin	Dabigatran etexilate 150 mg twice daily vs. warfarin
Age (years)		
< 65	0.32 (0.18, 0.57)	0.35 (0.20, 0.61)
65 ≤ and < 75	0.71 (0.56, 0.89)	0.82 (0.66, 1.03)
≥ 75	1.01 (0.84, 1.23)	1.19 (0.99, 1.43)
≥ 80	1.14 (0.86, 1.51)	1.35 (1.03, 1.76)
CrCL(mL/min)		
30 ≤ and < 50	1.02 (0.79, 1.32)	0.94 (0.73, 1.22)
50 ≤ and < 80	0.75 (0.61, 0.92)	0.90 (0.74, 1.09)
≥ 80	0.59 (0.43, 0.82)	0.87 (0.65, 1.17)
ASA use	0.84 (0.69, 1.03)	0.97 (0.79, 1.18)
Clopidogrel use	0.89 (0.55, 1.45)	0.92 (0.57, 1.48)

RELY-ABLE (Long term multi-center extension of dabigatran treatment in patients with atrial fibrillation who completed the RE-LY trial)

The RE-LY extension study (RELY-ABLE) provided additional safety information for a cohort of patients which continued the same dose of dabigatran etexilate as assigned in the RE-LY trial. Patients were eligible for the RELY-ABLE trial if they had not permanently discontinued study medication at the time of their final RE-LY study visit. Enrolled patients continued to receive the same double-blind dabigatran etexilate dose randomly allocated in RE-LY, for up to 43 months of follow up after RE-LY (total mean follow-up RE-LY + RELY-ABLE, 4.5 years). There were 5897 patients enrolled, representing 49 % of patients originally randomly assigned to receive dabigatran etexilate in RE-LY and 86 % of RELY-ABLE-eligible patients.

During the additional 2.5 years of treatment in RELY-ABLE, with a maximum exposure of over 6 years (total exposure in RELY + RELY-ABLE), the long-term safety profile of dabigatran etexilate was confirmed for both test doses 110 mg b.i.d. and 150 mg b.i.d.. No new safety findings were observed.

The rates of outcome events including, major bleed and other bleeding events were consistent with those seen in RE-LY.

### Paediatric population (SPAF)

The European Medicines Agency has waived the obligation to submit the results of studies with Pradaxa in all subsets of the paediatric population in prevention of thromboembolic events for the granted indication (see section 4.2 for information on paediatric use).

### Ethnic origin (SPAF)

No clinically relevant ethnic differences among Caucasians, African-American, Hispanic, Japanese or Chinese patients were observed.

### Clinical efficacy and safety (DVT/PE treatment)

#### *Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE) in adults (DVT/PE treatment)*

The efficacy and safety was investigated in two multi-center, randomised, double blind, parallel-group, replicate studies RE-COVER and RE-COVER II. These studies compared dabigatran etexilate (150 mg bid) with warfarin (target INR 2.0-3.0) in patients with acute DVT and/or PE. The primary objective of these studies was to determine if dabigatran etexilate was non-inferior to warfarin in reducing the occurrence of the primary endpoint which was the composite of recurrent symptomatic DVT and/or PE and related deaths within the 6 month treatment period.

In the pooled RE-COVER and RE-COVER II studies, a total of 5,153 patients were randomized and 5,107 were treated.

The duration of treatment with fixed dose of dabigatran was 174.0 days without coagulation monitoring. For patients randomized to warfarin, the median time in therapeutic range (INR 2.0 to 3.0) was 60.6 %.

The trials, demonstrated that treatment with dabigatran etexilate 150 mg twice daily was non-inferior to the treatment with warfarin ( non-inferiority margin for RE-COVER and RE-COVER II: 3.6 for risk difference and 2.75 for hazard ratio):-

Table 14: Analysis of the primary and secondary efficacy endpoints (VTE is a composite of DVT and/or PE) until the end of post-treatment period for the pooled studies RE-COVER and RE-COVER II

	Dabigatran etexilate 150 mg twice daily	Warfarin
Treated patients	2,553	2,554
Recurrent symptomatic VTE and VTE-related death	68 ( 2.7 %)	62 ( 2.4 %)
Hazard ratio vs warfarin (95% confidence interval)	1.09 (0.77, 1.54)	
Secondary efficacy endpoints		
Recurrent symptomatic VTE and all-cause deaths	109 (4.3 %)	104 (4.1 %)
95 % confidence interval	3.52, 5.13	3.34, 4.91
Symptomatic DVT	45 (1.8 %)	39 (1.5 %)
95 % confidence interval	1.29, 2.35	1.09, 2.08
Symptomatic PE	27 (1.1 %)	26 (1.0 %)

95 % confidence interval	0.70, 1.54	0.67, 1.49
VTE-related deaths	4 (0.2 %)	3 (0.1 %)
95 % confidence interval	0.04, 0.40	0.02, 0.34
All-cause deaths	51 (2.0 %)	52 (2.0 %)
95 % confidence interval	1.49, 2.62	1.52, 2.66

#### Ethnic origin (DVT/PE treatment)

No clinically relevant ethnic differences among Caucasians, African-American, Hispanic, Japanese or Chinese patients were observed.

#### Paediatric population (DVT/PE treatment)

The European Medicines Agency has deferred the obligation to submit the results of studies with Pradaxa in all subsets of the paediatric population for DVT/PE treatment (see section 4.2 for information on paediatric use).

The pharmacokinetics and pharmacodynamics of dabigatran etexilate administered twice daily for three consecutive days (total 6 doses) at the end of standard anticoagulant therapy were assessed in an open-label safety and tolerability study in 9 stable adolescents (12 to < 18 years). All patients received an initial oral dose of 1.71 ( $\pm$  10%) mg/kg of dabigatran etexilate (80 % of the adult dose of 150 mg/70 kg adjusted for the patient's weight). Based on dabigatran concentrations and clinical assessment, the dose was subsequently modified to a target dose of 2.14 ( $\pm$  10 %) mg/kg of dabigatran etexilate (100 % of the adult dose adjusted for the patient's weight). In this small number of adolescents, dabigatran etexilate capsules were apparently tolerated with only three mild and transient gastrointestinal adverse events reported by two patients. According to the relatively low exposure, coagulation at 72 hrs (presumed dabigatran trough level at steady state or close to steady state conditions) was only slightly prolonged with aPTT at maximum 1.60 fold, ECT 1.86 fold, and Hemoclot<sup>®</sup> TT (Anti-FIIa) 1.36 fold, respectively. Dabigatran plasma concentrations observed at 72 hrs were relatively low, between 32.9 ng/mL and 97.2 ng/mL at final doses between 100 mg and 150 mg (gMean dose normalized total dabigatran plasma concentration of 0.493 ng/mL/mg).

#### Clinical efficacy and safety (DVT/PE prevention)

##### *Prevention of recurrent deep vein thrombosis (DVT) and pulmonary embolism (PE) in adults (DVT/PE prevention)*

Two randomized, parallel group, double-blind studies were performed in patients previously treated with anticoagulation therapy. RE-MEDY, warfarin controlled study, enrolled patients already treated for 3 to 12 months with the need for further anticoagulant treatment and RE-SONATE, the placebo controlled study, enrolled patients already treated for 6 to 18 months with Vitamin K inhibitors.

The objective of the RE-MEDY study was to compare the safety and efficacy of oral dabigatran etexilate (150 mg bid) to warfarin (target INR 2.0-3.0) for the long-term treatment and prevention of recurrent, symptomatic DVT and/or PE. A total of 2,866 patients were randomized and 2,856 patients were treated. Duration of dabigatran etexilate treatment ranged from 6 to 36 months (median 534.0 days). For patients randomized to warfarin, the median time in therapeutic range (INR 2.0-3.0) was 64.9 %.

RE-MEDY demonstrated that treatment with dabigatran etexilate 150 mg twice daily was non-inferior to warfarin (non-inferiority margin 2.85 for hazard ratio and 2.8 for risk difference).

Table 15: Analysis of the primary and secondary efficacy endpoints (VTE is a composite of DVT and/or PE) until the end of post-treatment period for the RE-MEDY study

	Dabigatran etexilate 150 mg twice daily	Warfarin
Treated patients	1430	1426
Recurrent symptomatic VTE and VTE-related death	26 (1.8 %)	18 (1.3 %)
Hazard ratio vs warfarin (95% confidence interval)	1.44 (0.78, 2.64)	
non-inferiority margin	2.85	
Patients with event at 18 months	22	17
Cumulative risk at 18 months (%)	1.7	1.4
Risk difference vs. warfarin (%)	0.4	
95% confidence interval		
non-inferiority margin	2.8	
Secondary efficacy endpoints		
Recurrent symptomatic VTE and all-cause deaths	42 (2.9 %)	36 (2.5 %)
95 % confidence interval	2.12, 3.95	1.77, 3.48
Symptomatic DVT	17 (1.2 %)	13 (0.9 %)
95 % confidence interval	0.69, 1.90	0.49, 1.55
Symptomatic PE	10 (0.7 %)	5 (0.4 %)
95 % confidence interval	0.34, 1.28	0.11, 0.82
VTE-related deaths	1 (0.1 %)	1 (0.1 %)
95 % confidence interval	0.00, 0.39	0.00, 0.39
All-cause deaths	17 (1.2 %)	19 (1.3 %)
95 % confidence interval	0.69, 1.90	0.80, 2.07

The objective of the RE-SONATE study was to evaluate superiority of dabigatran etexilate versus placebo for the prevention of recurrent symptomatic DVT and/or PE in patients who had already completed 6 to 18 months of treatment with VKA. The intended therapy was 6 months dabigatran etexilate 150 mg twice daily without need for monitoring.

RE-SONATE demonstrated dabigatran etexilate was superior to placebo for the prevention of recurrent symptomatic DVT/PE events including unexplained deaths, with a risk reduction from 5.6 % to 0.4 % (relative risk reduction 92 % based on hazard ratio) during the treatment period ( $p < 0.0001$ ). All secondary and sensitivity analyses of the primary endpoint and all secondary endpoints showed superiority of dabigatran etexilate over placebo.

The study included observational follow-up for 12 months after the conclusion of treatment. After discontinuation of study medication the effect was maintained until the end of the follow-up, indicating that the initial treatment effect of dabigatran etexilate was sustained. No rebound effect was observed. At the end of the follow-up VTE events in patients treated with dabigatran etexilate was 6.9 % vs. 10.7 % among the placebo group (hazard ratio 0.61 (95% CI 0.42, 0.88),  $p = 0.0082$ ).

Table 16: Analysis of the primary and secondary efficacy endpoints (VTE is a composite of DVT and/or PE) until the end of post-treatment period for the RE-SONATE study.

	Dabigatran etexilate 150 mg twice daily	Placebo
Treated patients	681	662
Recurrent symptomatic VTE and related deaths	3 (0.4 %)	37 (5.6 %)
Hazard Ratio vs placebo (95% confidence interval)	0.08 (0.02, 0.25)	
p-value for superiority	< 0.0001	
Secondary efficacy endpoints		
Recurrent symptomatic VTE and all-cause deaths	3 (0.4 %)	37 (5.6 %)
95% confidence interval	0.09, 1.28	3.97, 7.62
Symptomatic DVT	2 (0.3 %)	23 (3.5 %)
95% confidence interval	0.04, 1.06	2.21, 5.17
Symptomatic PE	1 (0.1 %)	14 (2.1 %)
95% confidence interval	0.00, 0.82	1.16, 3.52
VTE-related deaths	0 (0)	0 (0)
95% confidence interval	0.00, 0.54	0.00, 0.56
Unexplained deaths	0 (0)	2 (0.3 %)
95% confidence interval	0.00, 0.54	0.04, 1.09
All-cause deaths	0 (0)	2 (0.3 %)
95% confidence interval	0.00, 0.54	0.04, 1.09

#### Ethnic origin (DVT/PE prevention)

No clinically relevant ethnic differences among Caucasians, African-American, Hispanic, Japanese or Chinese patients were observed.

#### Paediatric population (DVT/PE prevention)

The European Medicines Agency has deferred the obligation to submit the results of studies with Pradaxa in all subsets of the paediatric population for DVT/PE prevention (see section 4.2 for information on paediatric use).

#### *Clinical trials for the prevention of thromboembolism in patients with prosthetic heart valves*

A phase II study examined dabigatran etexilate and warfarin in a total of 252 patients with recent mechanical valve replacement surgery (i.e. within the current hospital stay) and in patients who received a mechanical heart valve replacement more than three months ago. More thromboembolic events (mainly strokes and symptomatic/asymptomatic prosthetic valve thrombosis) and more bleeding events were observed with dabigatran etexilate than with warfarin. In the early post-operative patients, major bleeding manifested predominantly as haemorrhagic pericardial effusions, specifically in patients who started dabigatran etexilate early (i.e. on Day 3) after heart valve replacement surgery (see section 4.3).

## **5.2 Pharmacokinetic properties**

After oral administration, dabigatran etexilate is rapidly and completely converted to dabigatran, which is the active form in plasma. The cleavage of the prodrug dabigatran etexilate by



esterase-catalysed hydrolysis to the active principle dabigatran is the predominant metabolic reaction. The absolute bioavailability of dabigatran following oral administration of Pradaxa was approximately 6.5 %.

After oral administration of Pradaxa in healthy volunteers, the pharmacokinetic profile of dabigatran in plasma is characterized by a rapid increase in plasma concentrations with  $C_{max}$  attained within 0.5 and 2.0 hours post administration.

### Absorption

A study evaluating post-operative absorption of dabigatran etexilate, 1-3 hours following surgery, demonstrated relatively slow absorption compared with that in healthy volunteers, showing a smooth plasma concentration-time profile without high peak plasma concentrations. Peak plasma concentrations are reached at 6 hours following administration in a postoperative period due to contributing factors such as anaesthesia, GI paresis, and surgical effects independent of the oral medicinal product formulation. It was demonstrated in a further study that slow and delayed absorption is usually only present on the day of surgery. On subsequent days absorption of dabigatran is rapid with peak plasma concentrations attained 2 hours after medicinal product administration.

Food does not affect the bioavailability of dabigatran etexilate but delays the time to peak plasma concentrations by 2 hours.

The oral bioavailability may be increased by 75 % after a single dose and 37 % at steady state compared to the reference capsule formulation when the pellets are taken without the Hydroxypropylmethylcellulose (HPMC) capsule shell. Hence, the integrity of the HPMC capsules should always be preserved in clinical use to avoid unintentionally increased bioavailability of dabigatran etexilate. Therefore, patients should be advised not to open the capsules and taking the pellets alone (e.g. sprinkled over food or into beverages) (see section 4.2).

### Distribution

Low (34-35 %) concentration independent binding of dabigatran to human plasma proteins was observed. The volume of distribution of dabigatran of 60-70 L exceeded the volume of total body water indicating moderate tissue distribution of dabigatran.

$C_{max}$  and the area under the plasma concentration-time curve were dose proportional. Plasma concentrations of dabigatran showed a biexponential decline with a mean terminal half-life of 11 hours in healthy elderly subjects. After multiple doses a terminal half-life of about 12-14 hours was observed. The half-life was independent of dose. Half-life is prolonged if renal function is impaired as shown in table 17.

### Biotransformation

Metabolism and excretion of dabigatran were studied following a single intravenous dose of radiolabeled dabigatran in healthy male subjects. After an intravenous dose, the dabigatran-derived radioactivity was eliminated primarily in the urine (85 %). Faecal excretion accounted for 6 % of the administered dose. Recovery of the total radioactivity ranged from 88-94 % of the administered dose by 168 hours post dose.

Dabigatran is subject to conjugation forming pharmacologically active acylglucuronides. Four positional isomers, 1-O, 2-O, 3-O, 4-O-acylglucuronide exist, each accounts for less than 10 % of total dabigatran in plasma. Traces of other metabolites were only detectable with highly sensitive analytical methods. Dabigatran is eliminated primarily in the unchanged form in the urine, at a rate of approximately 100 mL/min corresponding to the glomerular filtration rate.

## Special populations

### Renal insufficiency

In phase I studies the exposure (AUC) of dabigatran after the oral administration of Pradaxa is approximately 2.7-fold higher in volunteers with moderate renal insufficiency (CrCL between 30–50 mL/min) than in those without renal insufficiency.

In a small number of volunteers with severe renal insufficiency (CrCL 10-30 mL/min), the exposure (AUC) to dabigatran was approximately 6 times higher and the half-life approximately 2 times longer than that observed in a population without renal insufficiency (see sections 4.2, 4.3 and 4.4).

Table 17: Half-life of total dabigatran in healthy subjects and subjects with impaired renal function.

glomerular filtration rate (CrCL, [mL/min])	gMean (gCV %; range) half-life [h]
≥ 80	13.4 (25.7 %; 11.0-21.6)
≥ 50-< 80	15.3 (42.7 %; 11.7-34.1)
≥ 30-< 50	18.4 (18.5 %; 13.3-23.0)
< 30	27.2 (15.3 %; 21.6-35.0)

Additionally, dabigatran exposure (at trough and peak) was assessed in a prospective open label randomized pharmacokinetic study in NVAf patients with severe renal impairment (defined as creatinine clearance [CrCl] 15-30 mL/min) receiving dabigatran etexilate 75 mg twice daily. This regimen resulted in a geometric mean trough concentration of 155 ng/ml (gCV of 76.9 %), measured immediately before administration of the next dose and in a geometric mean peak concentration of 202 ng/ml (gCV of 70.6 %) measured two hours after the administration of the last dose.

Clearance of dabigatran by haemodialysis was investigated in 7 patients with end-stage renal disease (ESRD) without atrial fibrillation. Dialysis was conducted with 700 mL/min dialysate flow rate, four hour duration and a blood flow rate of either 200 mL/min or 350-390 mL/min. This resulted in a removal of 50 % to 60 % of dabigatran concentrations, respectively. The amount of drug cleared by dialysis is proportional to the blood flow rate up to a blood flow rate of 300 mL/min. The anticoagulant activity of dabigatran decreased with decreasing plasma concentrations and the PK/PD relationship was not affected by the procedure.

The median CrCL in RE-LY was 68.4 mL/min. Almost half (45.8 %) of the RE-LY patients had a CrCL > 50-< 80 mL/min. Patients with moderate renal impairment (CrCL between 30 and 50 mL/min) had on average 2.29-fold and 1.81-fold higher pre- and post-dose dabigatran plasma concentrations, respectively, when compared with patients without renal impairment (CrCL ≥ 80 mL/min).

The median CrCL in the RE-COVER study was 100.4 mL/min. 21.7 % of patients had mild renal impairment (CrCL > 50 - < 80 mL/min) and 4.5% of patients had a moderate renal impairment (CrCL between 30 and 50 mL/min). Patients with mild and moderate renal impairment had at steady state an average 1.8-fold and 3.6-fold higher pre-dosedabigatran plasma concentrations compared with patients with CrCL > 80 mL/min, respectively. Similar values for CrCL were found in RE-COVER II.

The median CrCL in the RE-MEDY and RE-SONATE studies were 99.0 mL/min and 99.7 mL/min, respectively. 22.9 % and 22.5 % of the patients had a CrCL > 50-< 80 mL/min, and 4.1 % and 4.8 % had a CrCL between 30 and 50 mL/min in in the RE-MEDY and RE-SONATE studies.

### Elderly patients

Specific pharmacokinetic phase I studies with elderly subjects showed an increase of 40 to 60 % in the AUC and of more than 25 % in C<sub>max</sub> compared to young subjects.

The effect by age on exposure to dabigatran was confirmed in the RE-LY study with an about 31 % higher trough concentration for subjects  $\geq 75$  years and by about 22 % lower trough level for subjects  $< 65$  years compared to subjects between 65 and 75 years (see sections 4.2 and 4.4).

#### Hepatic impairment

No change in dabigatran exposure was seen in 12 subjects with moderate hepatic insufficiency (Child Pugh B) compared to 12 controls (see sections 4.2 and 4.4).

#### Body weight

The dabigatran trough concentrations were about 20 % lower in patients with a body weight  $> 100$  kg compared with 50-100 kg. The majority (80.8 %) of the subjects were in the  $\geq 50$  kg and  $< 100$  kg category with no clear difference detected (see sections 4.2 and 4.4). Limited clinical data in patients  $< 50$  kg are available.

#### Gender

In atrial fibrillation patients females had on average 30 % higher trough and post-dose concentrations. No dose adjustment is recommended (see section 4.2).

#### Ethnic origin

No clinically relevant inter-ethnic differences among Caucasian, African-American, Hispanic, Japanese or Chinese patients were observed regarding dabigatran pharmacokinetics and pharmacodynamics.

#### Pharmacokinetic interactions

The pro-drug dabigatran etexilate but not dabigatran is a substrate of the efflux transporter P-gp. Therefore concomitant use of P-gp transporter inhibitors (amiodarone, verapamil, clarithromycin, quinidine, dronedarone, ticagrelor and ketoconazole) and inducers (rifampicin) had been investigated (see sections 4.2, 4.4 and 4.5).

*In vitro* interaction studies did not show any inhibition or induction of the principal isoenzymes of cytochrome P450. This has been confirmed by *in vivo* studies with healthy volunteers, who did not show any interaction between this treatment and the following active substances: atorvastatin (CYP3A4), digoxin (P-gp transporter interaction) and diclofenac (CYP2C9).

### **5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on conventional studies of safety pharmacology, repeated dose toxicity and genotoxicity.

Effects observed in the repeat-dose toxicity studies were due to the exaggerated pharmacodynamic effect of dabigatran.

An effect on female fertility was observed in the form of a decrease in implantations and an increase in pre-implantation loss at 70 mg/kg (5-fold the plasma exposure level in patients). At doses that were toxic to the mothers (5- to 10-fold the plasma exposure level in patients), a decrease in foetal body weight and viability along with an increase in foetal variations were observed in rats and rabbits. In the pre- and post-natal study, an increase in foetal mortality was observed at doses that were toxic to the dams (a dose corresponding to a plasma exposure level 4-fold higher than observed in patients).

In lifetime toxicology studies in rats and mice, there was no evidence for a tumorigenic potential of dabigatran up to maximum doses of 200 mg/kg.

Dabigatran, the active moiety of dabigatran etexilate mesilate, is persistent in the environment.

## **6. PHARMACEUTICAL PARTICULARS**

### **6.1 List of excipients**

#### Capsule fill

- Tartaric acid
- Acacia
- Hypromellose
- Dimeticone 350
- Talc
- Hydroxypropylcellulose

#### Capsule shell

- Carrageenan
- Potassium chloride
- Titanium dioxide
- Indigo carmine (E132)
- Hypromellose

#### Black printing ink

- Shellac
- Iron oxide black (E172)
- Potassium hydroxide

### **6.2 Incompatibilities**

Not applicable.

### **6.3 Shelf life**

Blister and bottle: 3 years

Once the bottle is opened, the medicinal product must be used within 4 months.

### **6.4 Special precautions for storage**

#### Blister

Store in the original package in order to protect from moisture.

#### Bottle

Store in the original package in order to protect from moisture. Keep the bottle tightly closed.

### **6.5 Nature and contents of container**

Cartons containing 10 x 1, 30 x 1 or 60 x 1 hard capsules, a multipack containing 3 packs of 60 x 1 hard capsules (180 hard capsules) and a multipack containing 2 packs of 50 x 1 hard capsules (100 hard capsules) in perforated aluminium unit dose blisters. Furthermore, cartons containing 6 blister strips (60 x 1) in perforated aluminium unit dose white blisters.

Polypropylene bottle with a screw cap containing 60 hard capsules.

Not all pack sizes may be marketed.

## **6.6 Special precautions for disposal and other handling**

When taking Pradaxa capsules out of the blister pack, the following instructions should be followed:

- One individual blister should be torn off from the blister card along the perforated line.
- The backing foil should be peeled off and the capsule can be removed.
- The hard capsules should not be pushed through the blister foil.
- The blister foil should only be peeled off, when a hard capsule is required.

When taking a hard capsule out of the bottle, the following instructions should be observed:

- The cap opens by pushing and turning.
- After taking the capsule out, the cap should be returned on the bottle right away and the bottle should be tightly closed.

## **7. MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

## **8. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/009  
EU/1/08/442/010  
EU/1/08/442/011  
EU/1/08/442/012  
EU/1/08/442/013  
EU/1/08/442/016  
EU/1/08/442/019

## **9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

Date of first authorisation: 18 March 2008  
Date of latest renewal: 17 January 2013

## **10. DATE OF REVISION OF THE TEXT**

Detailed information on this medicinal product is available on the website of the European Medicines Agency <http://www.ema.europa.eu/>.

## **ANNEX II**

- A. MANUFACTURER(S) RESPONSIBLE FOR BATCH RELEASE**
- B. CONDITIONS OR RESTRICTIONS REGARDING SUPPLY AND USE**
- C. OTHER CONDITIONS AND REQUIREMENTS OF THE MARKETING AUTHORISATION**
- D. CONDITIONS OR RESTRICTIONS WITH REGARD TO THE SAFE AND EFFECTIVE USE OF THE MEDICINAL PRODUCT**
- E. SPECIFIC OBLIGATION TO COMPLETE POST-AUTHORISATIONS MEASURES**

## **A. MANUFACTURER(S) RESPONSIBLE FOR BATCH RELEASE**

Name and address of the manufacturer(s) responsible for batch release

Boehringer Ingelheim Pharma GmbH & Co. KG  
Binger Strasse 173  
D-55216 Ingelheim am Rhein  
Germany

Boehringer Ingelheim Pharma GmbH & Co. KG  
Birkendorfer Strasse 65  
D-88397 Biberach an der Riss  
Germany

The printed package leaflet of the medicinal product must state the name and address of the manufacturer responsible for the release of the concerned batch.

## **B. CONDITIONS OR RESTRICTIONS REGARDING SUPPLY AND USE**

Medicinal product subject to medical prescription.

## **C. OTHER CONDITIONS AND REQUIREMENTS OF THE MARKETING AUTHORISATION**

### **• Periodic Safety Update Reports**

The requirements for submission of periodic safety update reports for this medicinal product are set out in the list of Union references dates (EURD list) provided for under Article 107c(7) of Directive 1002/83/EC and any subsequent updates published on the European medicines web-portal.

## **D. CONDITIONS OR RESTRICTIONS WITH REGARD TO THE SAFE AND EFFECTIVE USE OF THE MEDICINAL PRODUCT**

### **• Risk Management Plan (RMP)**

The MAH shall perform the required pharmacovigilance activities and interventions detailed in the agreed RMP presented in Module 1.8.2 of the Marketing Authorisation and any agreed subsequent updates of the RMP.

An updated RMP should be submitted

- At the request of the European Medicines Agency;
- Whenever the risk management system is modified, especially as the result of new information being received that may lead to significant change to the benefit/risk profile or as the result of an important (pharmacovigilance or risk minimisation) milestone being reached.

### **• Additional risk minimisation measures**

The MAH shall provide an educational pack for each therapeutic indication, targeting all physicians who are expected to prescribe/use Pradaxa. This educational pack is aimed at increasing awareness about the potential risk of bleeding during treatment with Pradaxa and providing guidance on how to manage that risk.

The MAH must agree the content and format of the educational material, together with a communication plan, with the national competent authority prior to distribution of the educational

pack. The educational pack must be available for distribution for all therapeutic indications prior to launch ) in the Member State.

The physician educational pack should contain:

- The Summary of Product Characteristics
- Prescriber Guide
- Patient Alert Cards

The Prescriber Guide should contain the following key safety messages:

- Details of populations potentially at higher risk of bleeding
- Information on medicinal products that are contraindicated or which should be used with caution due to an increased risk of bleeding and/or increased dabigatran exposure
- Contraindication for patients with prosthetic heart valves requiring anticoagulant treatment
- Recommendation for kidney function measurement
- Recommendations for dose reduction in at risk populations
- Management of overdose situations
- The use of coagulation tests and their interpretation
- That all patients should be provided with a Patient alert card and be counselled about:
  - Signs or symptoms of bleeding and when to seek attention from a health care provider.
  - Importance of treatment compliance
  - Necessity to carry the Patient alert card with them at all times
  - The need to inform Health Care Professionals about all medicines they are currently taking
  - The need to inform Health Care Professionals that they are taking Pradaxa if they need to have any surgery or invasive procedure.
- An instruction how to take Pradaxa

The MAH shall also provide a patient alert card in each medication pack, the text of which is included in Annex III.

#### **E. SPECIFIC OBLIGATIONS TO COMPLETE POST-AUTHORISATION MEASURES**

Not applicable.



**ANNEX III**  
**LABELLING AND PACKAGE LEAFLET**

## **A. LABELLING**

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**FOLDING BOX FOR BLISTER for 75 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 75 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 75 mg dabigatran etexilate (as mesilate).

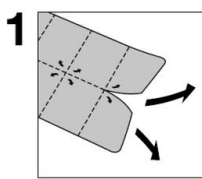
**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

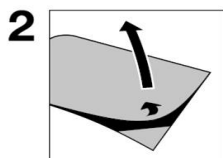
10 x 1 hard capsule  
30 x 1 hard capsule  
60 x 1 hard capsule

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.  
Patient alert card inside.



Tear-off



Peel-off

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/001 10 x 1 capsules  
EU/1/08/442/002 30 x 1 capsules  
EU/1/08/442/003 60 x 1 capsules  
EU/1/08/442/017 60 x 1 capsules

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Pradaxa 75 mg

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

<b>18. UNIQUE IDENTIFIER - HUMAN READABLE DATA</b>
--

PC: {number} [product code]

SN: {number} [serial number]

NN: {number} [national reimbursement number or other national number identifying the medicinal product]

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**FOLDING BOX FOR BLISTER for 110 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 110 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 110 mg dabigatran etexilate (as mesilate).

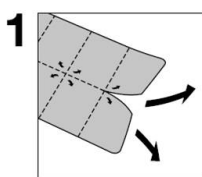
**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

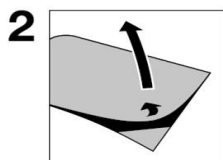
10 x 1 hard capsule  
30 x 1 hard capsule  
60 x 1 hard capsule

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.  
Patient alert card inside.



Tear-off



Peel-off

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/005 10 x 1 capsules  
EU/1/08/442/006 30 x 1 capsules  
EU/1/08/442/007 60 x 1 capsules  
EU/1/08/442/018 60 x 1 capsules

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Pradaxa 110 mg

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

<b>18. UNIQUE IDENTIFIER - HUMAN READABLE DATA</b>
--

PC: {number} [product code]

SN: {number} [serial number]

NN: {number} [national reimbursement number or other national number identifying the medicinal product]



**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**MULTIPACK OF 180 (3 PACKS OF 60 HARD-CAPSULES) – WITHOUT BLUE BOX –  
110 mg HARD CAPSULES**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 110 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 110 mg dabigatran etexilate (as mesilate).

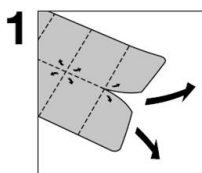
**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

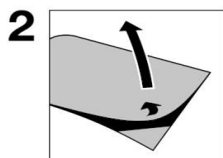
60x1 hard capsules. Component of a multipack, can't be sold separately.

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.  
Patient alert card inside.



Tear-off



Peel-off

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT  
OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE****11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/014

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY****15. INSTRUCTIONS ON USE****16. INFORMATION IN BRAILLE**

Pradaxa 110 mg

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**OUTER WRAPPER LABEL ON MULTIPACK OF 180 (3 PACKS OF 60 HARD CAPSULES) WRAPPED IN TRANSPARENT FOIL – INCLUDING THE BLUE BOX – 110 mg HARD CAPSULES**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 110 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 110 mg dabigatran etexilate (as mesilate).

**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

Multipack: 180 (3 packs of 60x1) hard capsules.

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/014

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Pradaxa 110 mg

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC: {number} [product code]

SN: {number} [serial number]

NN: {number} [national reimbursement number or other national number identifying the medicinal product]

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**MULTIPACK OF 100 (2 PACKS OF 50 HARD-CAPSULES) – WITHOUT BLUE BOX –  
110 mg HARD CAPSULES**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 110 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 110 mg dabigatran etexilate (as mesilate).

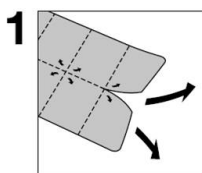
**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

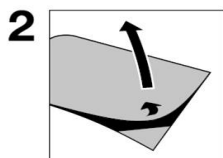
50x1 hard capsules. Component of a multipack, can't be sold separately.

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.  
Patient alert card inside.



Tear-off



Peel-off

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT  
OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE****11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/015

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY****15. INSTRUCTIONS ON USE****16. INFORMATION IN BRAILLE**

Pradaxa 110 mg

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**OUTER WRAPPER LABEL ON MULTIPACK OF 100 (2 PACKS OF 50 HARD CAPSULES) WRAPPED IN TRANSPARENT FOIL – INCLUDING THE BLUE BOX – 110 mg HARD CAPSULES**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 110 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 110 mg dabigatran etexilate (as mesilate).

**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

Multipack: 100 (2 packs of 50x1) hard capsules.

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/015

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Pradaxa 110 mg

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC: {number} [product code]  
SN: {number} [serial number]  
NN: {number} [national reimbursement number or other national number identifying the medicinal product]



**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**FOLDING BOX FOR BLISTER for 150 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 150 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 150 mg dabigatran etexilate (as mesilate).

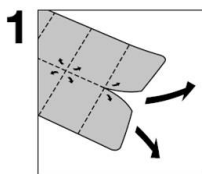
**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

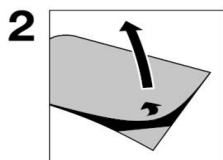
10 x 1 hard capsule  
30 x 1 hard capsule  
60 x 1 hard capsule

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.  
Patient alert card inside.



Tear-off



Peel-off

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE****11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/009 10 x 1 capsules  
EU/1/08/442/01030 x 1 capsules  
EU/1/08/442/011 60 x 1 capsules  
EU/1/08/442/019 60 x 1 capsules

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY****15. INSTRUCTIONS ON USE****16. INFORMATION IN BRAILLE**

Pradaxa 150 mg

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

<b>18. UNIQUE IDENTIFIER - HUMAN READABLE DATA</b>
--

PC: {number} [product code]

SN: {number} [serial number]

NN: {number} [national reimbursement number or other national number identifying the medicinal product]

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**MULTIPACK OF 180 (3 PACKS OF 60 HARD-CAPSULES) – WITHOUT BLUE BOX –  
150 mg HARD CAPSULES**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 150 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 150 mg dabigatran etexilate (as mesilate).

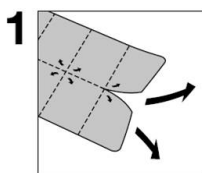
**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

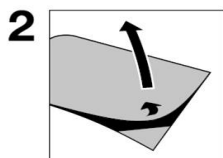
60x1 hard capsules. Component of a multipack, can't be sold separately.

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.  
Patient alert card inside.



Tear-off



Peel-off

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT  
OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE****11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/012

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY****15. INSTRUCTIONS ON USE****16. INFORMATION IN BRAILLE**

Pradaxa 150 mg

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**OUTER WRAPPER LABEL ON MULTIPACK OF 180 (3 PACKS OF 60 HARD CAPSULES) WRAPPED IN TRANSPARENT FOIL – INCLUDING THE BLUE BOX – 150 mg HARD CAPSULES**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 150 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 150 mg dabigatran etexilate (as mesilate).

**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

Multipack: 180 (3 packs of 60x1) hard capsules.

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/012

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Pradaxa 150 mg

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC: {number} [product code]

SN: {number} [serial number]

NN: {number} [national reimbursement number or other national number identifying the medicinal product]

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**MULTIPACK OF 100 (2 PACKS OF 50 HARD-CAPSULES) – WITHOUT BLUE BOX –  
150 mg HARD CAPSULES**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 150 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 150 mg dabigatran etexilate (as mesilate).

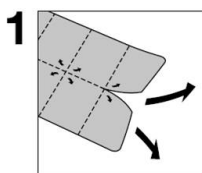
**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

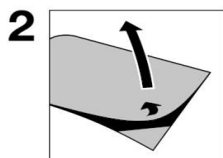
50x1 hard capsules. Component of a multipack, can't be sold separately.

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.  
Patient alert card inside.



Tear-off



Peel-off

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT  
OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**



**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE****11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/016

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY****15. INSTRUCTIONS ON USE****16. INFORMATION IN BRAILLE**

Pradaxa 150 mg

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**OUTER WRAPPER LABEL ON MULTIPACK OF 100 (2 PACKS OF 50 HARD CAPSULES) WRAPPED IN TRANSPARENT FOIL – INCLUDING THE BLUE BOX – 150 mg HARD CAPSULES**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 150 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 150 mg dabigatran etexilate (as mesilate).

**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

Multipack: 100 (2 packs of 50x1) hard capsules.

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP

**9. SPECIAL STORAGE CONDITIONS**

Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/016

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Pradaxa 150 mg

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC: {number} [product code]

SN: {number} [serial number]

NN: {number} [national reimbursement number or other national number identifying the medicinal product]

**MINIMUM PARTICULARS TO APPEAR ON BLISTERS OR STRIPS**

**BLISTER FOR 75 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 75 mg hard capsules  
Dabigatran etexilate

**2. NAME OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim (logo)

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

Lot

**5. OTHER**

 Peel back

**MINIMUM PARTICULARS TO APPEAR ON WHITE BLISTERS OR STRIPS**

**BLISTER FOR 75 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 75 mg hard capsules  
Dabigatran etexilate

**2. NAME OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim (logo)

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

Lot

**5. OTHER**

 Peel back

**MINIMUM PARTICULARS TO APPEAR ON BLISTERS OR STRIPS**

**BLISTER FOR 110 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 110 mg hard capsules  
Dabigatran etexilate

**2. NAME OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim (logo)

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

Lot

**5. OTHER**

 Peel back

**MINIMUM PARTICULARS TO APPEAR ON WHITE BLISTERS OR STRIPS**

**BLISTER FOR 110 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 110 mg hard capsules  
Dabigatran etexilate

**2. NAME OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim (logo)

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

Lot

**5. OTHER**

 Peel back

**MINIMUM PARTICULARS TO APPEAR ON BLISTERS OR STRIPS**

**BLISTER FOR 150 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 150 mg hard capsules  
Dabigatran etexilate

**2. NAME OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim (logo)

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

Lot

**5. OTHER**

 Peel back



**MINIMUM PARTICULARS TO APPEAR ON WHITE BLISTERS OR STRIPS**

**BLISTER FOR 150 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 150 mg hard capsules  
Dabigatran etexilate

**2. NAME OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim (logo)

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

Lot

**5. OTHER**

 Peel back

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING AND THE IMMEDIATE PACKAGING**

**FOLDING BOX AND LABEL FOR BOTTLE for 75 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 75 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 75 mg dabigatran etexilate (as mesilate).

**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

60 hard capsules

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.  
Patient alert card inside.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP  
Once opened, the product must be used within 4 months.

**9. SPECIAL STORAGE CONDITIONS**

Keep the bottle tightly closed. Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/004

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Pradaxa 75 mg (only applicable for folding box, not applicable for bottle label)

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC: {number} [product code]  
SN: {number} [serial number]  
NN: {number} [national reimbursement number or other national number identifying the medicinal product]

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING AND THE IMMEDIATE PACKAGING.**

**FOLDING BOX AND LABEL FOR BOTTLE for 110 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 110 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 110 mg dabigatran etexilate (as mesilate).

**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

60 hard capsules

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.  
Patient alert card inside.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP  
Once opened, the product must be used within 4 months.

**9. SPECIAL STORAGE CONDITIONS**

Keep the bottle tightly closed. Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/008

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Pradaxa 110 mg (only applicable for folding box, not applicable for bottle label)

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC: {number} [product code]

SN: {number} [serial number]

NN: {number} [national reimbursement number or other national number identifying the medicinal product]

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING AND THE IMMEDIATE PACKAGING.**

**FOLDING BOX AND LABEL FOR BOTTLE for 150 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pradaxa 150 mg hard capsules  
Dabigatran etexilate

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each hard capsule contains 150 mg dabigatran etexilate (as mesilate).

**3. LIST OF EXCIPIENTS**

**4. PHARMACEUTICAL FORM AND CONTENTS**

60 hard capsules

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Should be swallowed whole, do not chew or break the capsule.  
Read the package leaflet before use.  
Oral use.  
Patient alert card inside.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP  
Once opened, the product must be used within 4 months.

**9. SPECIAL STORAGE CONDITIONS**

Keep the bottle tightly closed. Store in the original package in order to protect from moisture.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Boehringer Ingelheim International GmbH  
Binger Str. 173  
D-55216 Ingelheim am Rhein  
Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/08/442/013

**13. BATCH NUMBER**

Lot

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Pradaxa 150 mg (only applicable for folding box, not applicable for bottle label)

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC: {number} [product code]  
SN: {number} [serial number]  
NN: {number} [national reimbursement number or other national number identifying the medicinal product]

**B. PACKAGE LEAFLET**



## Package leaflet: Information for the user

### Pradaxa 75 mg hard capsules dabigatran etexilate

**Read all of this leaflet carefully before you start taking this medicine because it contains important information for you.**

- Keep this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor or pharmacist.
- This medicine has been prescribed for you only. Do not pass it on to others. It may harm them, even if their signs of illness are the same as yours.
- If you get any side effects, talk to your doctor or pharmacist. This includes any possible side effects not listed in this leaflet. See section 4.

#### What is in this leaflet

1. What Pradaxa is and what it is used for
2. What you need to know before you take Pradaxa
3. How to take Pradaxa
4. Possible side effects
5. How to store Pradaxa
6. Contents of the pack and other information

#### 1. What Pradaxa is and what it is used for

Pradaxa is a medicine which contains the active substance dabigatran etexilate. It works by blocking a substance in the body which is involved in blood clot formation.

Pradaxa is used to prevent the formation of blood clots in the veins after knee or hip replacement surgery in adults.

#### 2. What you need to know before you take Pradaxa

##### Do not take Pradaxa

- if you are allergic to dabigatran etexilate or any of the other ingredients of this medicine (listed in section 6).
- if you have severely reduced kidney function.
- if you are currently bleeding.
- if you have a disease in an organ of the body that increases the risk of serious bleeding.
- if you have an increased tendency to bleed. This may be inborn, of unknown cause or due to other medicines.
- if you have a severely reduced liver function or liver disease which could possibly cause death.
- if you are taking oral ketoconazole or itraconazole, medicines to treat fungal infections.
- if you are taking cyclosporine, a medicine to prevent organ rejection after transplantation.
- if you are taking dronedarone, a medicine used to prevent repetition of your problem of irregular heart beat.
- if you are taking medicines to prevent blood clotting (e.g. warfarin, rivaroxaban, apixaban or heparin), except when changing anticoagulant treatment or while having a venous or arterial line and you get heparin through this line to keep it open.
- if you have received an artificial heart valve

## Warnings and precautions

Talk to your doctor before taking Pradaxa. You may also need to talk to your doctor during treatment with Pradaxa if you experience symptoms or if you have to undergo surgery. Tell your doctor if you have or have had any medical conditions or illnesses, in particular any of those included in the following list:

- if you have a liver disease that is associated with changes in the blood tests, the use of Pradaxa is not recommended.
- if you have an increased bleeding risk, as could be the case in the following situations:
  - if you have been recently bleeding.
  - if you have had a surgical tissue removal (biopsy) in the past month.
  - if you have had a serious injury (e.g. a bone fracture, head injury or any injury requiring surgical treatment).
  - if you are suffering from an inflammation of the gullet or stomach.
  - if you have problems with reflux of gastric juice into the gullet.
  - if you are receiving medicines which could increase the risk of bleeding such as aspirin (acetylsalicylic acid), clopidogrel, ticagrelor.
  - if you are taking anti-inflammatory medicines such as diclofenac, ibuprofen, piroxicam.
  - if you are suffering from an infection of the heart (bacterial endocarditis).
  - if you know you have impaired kidney function, or you are suffering from dehydration (symptoms include feeling thirsty and passing reduced amounts of dark-coloured (concentrated) urine).
  - if you are older than 75 years.
  - if you weigh 50 kg or less.
- if you have had a heart attack or if you have been diagnosed with conditions that increase the risk to develop a heart attack.
- if you undergo a planned surgery. Pradaxa will need to be stopped temporarily due to an increased bleeding risk during and shortly after an operation. If possible, Pradaxa should be stopped at least 24 hours before an operation. In patients with a higher risk for bleeding your doctor may decide to stop treatment earlier.
- if you need to undergo an unplanned surgery. If possible, a surgery should be delayed until at least 12 hours after the last dose. If surgery cannot be delayed, there may be an increased risk of bleeding. Your doctor will consider this risk of bleeding together with the urgency of the surgery.
- if you have a tube (catheters) inserted into the back:  
A tube can be inserted into your back e.g. for anaesthesia or pain relief during or after surgery. If you are administered Pradaxa after removal of a catheter, your doctor will examine you regularly.
- if you fall or injure yourself during treatment, especially if you hit your head, please seek urgent medical attention. You may need to be checked by a doctor, as you may be at increased risk of bleeding.

## Children and adolescents

Pradaxa should not be used in children and adolescents below 18 years old.

## Other medicines and Pradaxa

Tell your doctor or pharmacist if you are taking, have recently taken or might take any other medicines. For instance:

- Medicines to reduce blood clotting (e.g. warfarin, phenprocoumon, heparin, clopidogrel, prasugrel, ticagrelor, rivaroxaban)
- Anti-inflammatory and pain reliever medicines (e.g. aspirine)
- St. John's wort, a herbal medicine for depression
- Antidepressant medicines called selective serotonin re-uptake inhibitors or serotonin-norepinephrine re-uptake inhibitors
- Rifampicin or clarithromycin, two antibiotics
- Medicines to treat abnormal heart beats (e.g. Amiodarone, dronedarone, quinidine, verapamil)  
If you are taking amiodarone-, quinidine- or verapamil-containing medicines, you should be treated with a reduced dose of 150 mg Pradaxa taken once a day as 2 capsules of 75 mg, because your bleeding risk may be increased. Pradaxa and these medicines should be taken at the same time.  
If you are taking verapamil containing medicines and your kidney function is decreased by more than half, you should be treated with a reduced dose of 75 mg Pradaxa because your bleeding risk may be increased.
- Medicines to treat fungal infections (e.g. ketoconazole, itraconazole, posaconazole), unless they are only applied to the skin
- Medicines to prevent organ rejection after transplantation (e.g. tacrolimus, cyclosporine)
- Anti-viral medicines for AIDS (e.g. ritonavir)
- Medicines for treatment of epilepsy (e.g. carbamazepine, phenytoin)

### **Pregnancy and breast-feeding**

The effects of Pradaxa on pregnancy and the unborn child are not known. You should not take Pradaxa if you are pregnant unless your doctor advises you that it is safe to do so. If you are a woman of child-bearing age, you should avoid becoming pregnant while you are taking Pradaxa.

You should not breast-feed while you are taking Pradaxa.

### **Driving and using machines**

Pradaxa has no known effects on the ability to drive or use machines.

## **3. How to take Pradaxa**

Always take this medicine exactly as your doctor has told you. Check with your doctor if you are not sure.

The recommended dose is 220 mg once a day (taken as 2 capsules of 110 mg).

If your kidney function is decreased by more than half or if you are 75 years of age or older, the recommended dose is 150 mg once a day (taken as 2 capsules of 75 mg).

If you are taking amiodarone-, quinidine- or verapamil-containing medicines the recommended dose is 150 mg once a day (taken as 2 capsules of 75 mg).

If you are taking verapamil containing medicines and your kidney function is decreased by more than half, you should be treated with a reduced dose of 75 mg Pradaxa because your bleeding risk may be increased.

### After knee replacement surgery

You should start treatment with Pradaxa within 1-4 hours after surgery finishes, taking a single capsule. Thereafter two capsules once a day should be taken for a total of 10 days.

### After hip replacement surgery

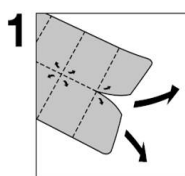
You should start treatment with Pradaxa within 1-4 hours after surgery finishes, taking a single capsule. Thereafter two capsules once a day should be taken for a total of 28-35 days.

For both surgery types, treatment should not be started if there is bleeding from the site of operation. If the treatment cannot be started until the day after surgery, dosing should be started with 2 capsules once a day.

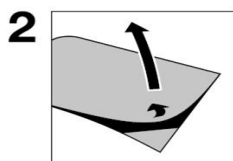
Pradaxa can be taken with or without food. The capsule should be swallowed whole with a glass of water, to ensure delivery to the stomach. Do not break, chew, or empty the pellets from the capsule since this may increase the risk of bleeding.

### **When taking Pradaxa capsules out of the blister pack, please observe the following instructions**

The following pictogram illustrates how to take Pradaxa capsules out of the blister



Tear off one individual blister from the blister card along the perforated line



Peel off the backing foil and remove the capsule.

- do not push the capsules through the blister foil.
- do not peel off the blister foil until a capsule is required.

### **When taking Pradaxa capsules out of the bottle, please observe the following instructions**

- push and turn for opening.
- after removing the capsule, place the cap back on the bottle and tightly close the bottle right away after you take your dose.

### **Change of anticoagulant treatment**

- *Changing from treatment with Pradaxa to anticoagulant treatment given by injection:*  
Do not start treatment with injectable anticoagulant medicines (for example, heparin) until 24 hours after the final dose of Pradaxa.
- *Changing from anticoagulant treatment given by injection to treatment with Pradaxa:*  
Start taking Pradaxa 0-2 hours before the time you would have had the next injection.

### **If you take more Pradaxa than you should**

If you take more Pradaxa than recommended, you may have an increased risk of bleeding. Your doctor can perform a blood test to assess the risk of bleeding.

Inform your doctor immediately, if you take more than the prescribed dose of Pradaxa. If bleeding occurs, surgical treatment or treatment with blood transfusions may be required.

### **If you forget to take Pradaxa**

Continue with your remaining daily doses of Pradaxa at the same time of the next day.

Do not take a double dose to make up for a forgotten dose.

### **If you stop taking Pradaxa**

Take Pradaxa exactly as prescribed. Do not stop taking Pradaxa without first consulting your doctor. Stopping Pradaxa may increase the risk of developing a blood clot in patients treated after hip- or knee-replacement surgery.

If you have any further questions on the use of this medicine, ask your doctor or pharmacist.

## **4. Possible side effects**

Like all medicines, this medicine can cause side effects, although not everybody gets them.

Pradaxa affects blood clotting, so most side effects are related to signs such as bruising or bleeding. Major or severe bleeding may occur, these constitute the most serious side effects and, regardless of location, may become disabling, life-threatening or even lead to death. In some cases these bleedings may not be obvious.

If you experience any bleeding event that does not stop by itself or if you experience signs of excessive bleeding (exceptional weakness, tiredness, paleness, dizziness, headache or unexplained swelling) consult your doctor immediately. Your doctor may decide to keep you under closer observation or change your medicine.

Tell your doctor immediately, if you experience a serious allergic reaction which causes difficulty in breathing or dizziness.

The side effects are listed below, grouped by how likely they are to happen.

Common (may affect up to 1 in 10 people):

- A fall in the amount of haemoglobin in the blood (the substance in the red blood cells)
- Unusual laboratory test results on liver function

Uncommon (may affect up to 1 in 100 people):

- Bleeding may happen from the nose, into the stomach or bowel, from penis/vagina or urinary tract (incl. blood in the urine that stains the urine pink or red), from piles, into the rectum, under the skin, into a joint, from or after an injury or after an operation
- Haematoma formation or bruising occurring after an operation
- Blood detected in the stools by a laboratory test
- A fall in the number of red cells in the blood
- A decrease in the proportion of red cells in the blood
- Allergic reaction
- Vomiting
- Frequent loose or liquid bowel movements
- Feeling sick
- Exudation of a small amount of liquid from the incision made for a surgical procedure
- Wound secretion (liquid exuding from the surgical wound)

Rare (may affect up to 1 in 1,000 people):

- Bleeding
- Bleeding may happen in the brain, from a surgical incision, from the site of entry of an injection or from the site of entry of a catheter into a vein
- Blood-stained discharge from the site of entry of a catheter into a vein
- Coughing of blood or blood stained sputum
- A fall in the number of platelets in the blood
- A fall in the number of red cells in the blood after an operation
- Serious allergic reaction which causes difficulty in breathing or dizziness

- Serious allergic reaction which causes swelling of the face or throat
- Skin rash notable for dark red, raised, itchy bumps caused by an allergic reaction
- Sudden change of the skin which affects its colour and appearance
- Itching
- Ulcer in the stomach or bowel (incl. ulcer in the gullet)
- Inflammation of the gullet and stomach
- Reflux of gastric juice into the gullet
- Belly ache or stomach ache
- Indigestion
- Difficulty in swallowing
- Fluid exiting a wound
- Fluid exiting a wound after an operation

Not known (frequency cannot be estimated from the available data):

- Difficulty in breathing or wheezing

### **Reporting of side effects**

If you get any side effects, talk to your doctor or pharmacist. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via [the national reporting system listed in Appendix V](#). By reporting side effects you can help provide more information on the safety of this medicine.

## **5. How to store Pradaxa**

Keep this medicine out of the sight and reach of children.

Do not use this medicine after the expiry date which is stated on the carton, blister or bottle after “EXP”. The expiry date refers to the last day of that month.

**Blister:** Store in the original package in order to protect from moisture. Do not put the capsules in pill boxes or pill organizers, unless capsules can be maintained in the original package.

**Bottle:** Once opened, the medicine must be used within 4 months. Keep the bottle tightly closed. Store in the original package in order to protect from moisture. Do not put the capsules in pill boxes or pill organizers.

## **6. Contents of the pack and other information**

### **What Pradaxa contains**

- The active substance is dabigatran, which is administered in the form of 75 mg dabigatran etexilate given as mesilate.
- The other ingredients are tartaric acid, acacia, hypromellose, dimeticone 350, talc, and hydroxypropylcellulose.
- The capsule shell contains carrageenan, potassium chloride, titanium dioxide, and hypromellose.
- The black printing ink contains shellac, iron oxide black and potassium hydroxide.

### **What Pradaxa looks like and contents of the pack**

Pradaxa 75 mg are hard capsules with an opaque, white cap and an opaque, white body. The Boehringer Ingelheim logo is printed on the cap and “R75” on the body of the capsule.

Pradaxa is available in packs containing 10 x 1, 30 x 1, 60 x 1 capsules in aluminium perforated unit dose blisters. Furthermore, Pradaxa is available in packs containing 60 x 1 capsules in aluminium perforated unit dose white blisters.

Pradaxa 75 mg hard capsules are also available in polypropylene (plastic) bottles with 60 hard capsules.

Not all pack sizes may be marketed.

**Marketing Authorisation Holder**

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**Manufacturer**

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**This leaflet was last approved in**

Detailed information on this medicine is available on the European Medicines Agency web site:  
<http://www.ema.europa.eu/>

## Package leaflet: Information for the user

### Pradaxa 110 mg hard capsules dabigatran etexilate

**Read all of this leaflet carefully before you start taking this medicine because it contains important information for you.**

- Keep this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor or pharmacist.
- This medicine has been prescribed for you only. Do not pass it on to others. It may harm them, even if their signs of illness are the same as yours.
- If you get any side effects, talk to your doctor or pharmacist. This includes any possible side effects not listed in this leaflet. See section 4.

#### **What is in this leaflet**

1. What Pradaxa is and what it is used for
2. What you need to know before you take Pradaxa
3. How to take Pradaxa
4. Possible side effects
5. How to store Pradaxa
6. Contents of the pack and other information

#### **1. What Pradaxa is and what it is used for**

Pradaxa is a medicine which contains the active substance dabigatran etexilate. It works by blocking a substance in the body which is involved in blood clot formation.

Pradaxa is used to prevent the formation of blood clots in the veins after knee or hip replacement surgery in adults.

Pradaxa is a medicine which is used to reduce the risk of brain or body vessel obstruction by blood clot formation in adult patients with an abnormal heart beat (atrial fibrillation) and additional risk factors. Pradaxa is a blood thinner medicine that lowers the risk of blood clot formation.

Pradaxa is a medicine which is used to treat blood clots in the veins of your legs and lungs and to prevent blood clots from re-occurring in the vein of your legs and lungs

#### **2. What you need to know before you take Pradaxa**

##### **Do not take Pradaxa**

- if you are allergic to dabigatran etexilate or any of the other ingredients of this medicine (listed in section 6).
- if you have severely reduced kidney function.
- if you are currently bleeding.
- if you have a disease in an organ of the body that increases the risk of serious bleeding.
- if you have an increased tendency to bleed. This may be inborn, of unknown cause or due to other medicines.
- if you have a severely reduced liver function or liver disease which could possibly cause death.
- if you are taking oral ketoconazole or itraconazole, medicines to treat fungal infections.
- if you are taking cyclosporine, a medicine to prevent organ rejection after transplantation.
- if you are taking dronedarone, a medicine used to prevent repetition of your problem of irregular heart beat.

- if you are taking medicines to prevent blood clotting (e.g. warfarin, rivaroxaban, apixaban or heparin), except when changing anticoagulant treatment or while having a venous or arterial line and you get heparin through this line to keep it open.
- if you have received an artificial heart valve

### **Warnings and precautions**

Talk to your doctor before taking Pradaxa. You may also need to talk to your doctor during treatment with Pradaxa if you experience symptoms or if you have to undergo surgery. Tell your doctor if you have or have had any medical conditions or illnesses, in particular any of those included in the following list:

- if you have a liver disease that is associated with changes in the blood tests, the use of Pradaxa is not recommended.
- if you have an increased bleeding risk, as could be the case in the following situations:
  - if you have been recently bleeding.
  - if you have had a surgical tissue removal (biopsy) in the past month.
  - if you have had a serious injury (e.g. a bone fracture, head injury or any injury requiring surgical treatment).
  - if you are suffering from an inflammation of the gullet or stomach.
  - if you have problems with reflux of gastric juice into the gullet.
  - if you are receiving medicines which could increase the risk of bleeding such as aspirin (acetylsalicylic acid), clopidogrel, ticagrelor.
  - if you are taking anti-inflammatory medicines such as diclofenac, ibuprofen, piroxicam.
  - if you are suffering from an infection of the heart (bacterial endocarditis).
  - if you know you have impaired kidney function, or you are suffering from dehydration (symptoms include feeling thirsty and passing reduced amounts of dark-coloured (concentrated) urine).
  - if you are older than 75 years.
  - if you weigh 50 kg or less.
- if you have had a heart attack or if you have been diagnosed with conditions that increase the risk to develop a heart attack.
- if you undergo a planned surgery. Pradaxa will need to be stopped temporarily due to an increased bleeding risk during and shortly after an operation. If possible, Pradaxa should be stopped at least 24 hours before an operation. In patients with a higher risk for bleeding your doctor may decide to stop treatment earlier.
- if you need to undergo an unplanned surgery. If possible, a surgery should be delayed until at least 12 hours after the last dose. If surgery cannot be delayed, there may be an increased risk of bleeding. Your doctor will consider this risk of bleeding together with the urgency of the surgery.
- if you have a tube (catheters) inserted into the back:  
A tube can be inserted into your back e.g. for anaesthesia or pain relief during or after surgery. If you are administered Pradaxa after removal of a catheter, your doctor will examine you regularly.
- if you fall or injure yourself during treatment, especially if you hit your head, please seek urgent medical attention. You may need to be checked by a doctor, as you may be at increased risk of bleeding.

### **Children and adolescents**

Pradaxa should not be used in children and adolescents below 18 years old.

## Other medicines and Pradaxa

Tell your doctor or pharmacist if you are taking, have recently taken or might take any other medicines. For instance:

- Medicines to reduce blood clotting (e.g. warfarin, phenprocoumon, heparin, clopidogrel, prasugrel, ticagrelor, rivaroxaban)
- Anti-inflammatory and pain reliever medicines (e.g. aspirine)
- St. John's wort, a herbal medicine for depression
- Antidepressant medicines called selective serotonin re-uptake inhibitors or serotonin-norepinephrine re-uptake inhibitors
- Rifampicin or clarithromycin, two antibiotics
- Medicines to treat abnormal heart beats (e.g. Amiodarone, dronedarone, quinidine, verapamil)

### Prevention of blood clot formation after knee or hip replacement surgery

If you are taking amiodarone-, quinidine- or verapamil-containing medicines, you should be treated with a reduced dose of 150 mg Pradaxa taken once a day as 2 capsules of 75 mg, because your bleeding risk may be increased. Pradaxa and these medicines should be taken at the same time.

If you are taking verapamil containing medicines and your kidney function is decreased by more than half, you should be treated with a reduced dose of 75 mg Pradaxa because your bleeding risk may be increased.

### Prevention of brain or body vessel obstruction by blood clot formation developing after abnormal heart beats and Treatment of blood clots in the veins of your legs and lungs including prevention of blood clots from re-occurring in the vein of your legs and lungs

If you are taking verapamil-containing medicines, you should be treated with a reduced Pradaxa dose of 220 mg taken as one 110 mg capsule twice a day, because your bleeding risk may be increased. Pradaxa and verapamil-containing medicines should be taken at the same time.

- Medicines to treat fungal infections (e.g. ketoconazole, itraconazole, posaconazole), unless they are only applied to the skin
- Medicines to prevent organ rejection after transplantation (e.g. tacrolimus, cyclosporine)
- Anti-viral medicines for AIDS (e.g. ritonavir)
- Medicines for treatment of epilepsy (e.g. carbamazepine, phenytoin)

## Pregnancy and breast-feeding

The effects of Pradaxa on pregnancy and the unborn child are not known. You should not take Pradaxa if you are pregnant unless your doctor advises you that it is safe to do so. If you are a woman of child-bearing age, you should avoid becoming pregnant while you are taking Pradaxa.

You should not breast-feed while you are taking Pradaxa.

## Driving and using machines

Pradaxa has no known effects on the ability to drive or use machines.

## 3. How to take Pradaxa

Always take this medicine exactly as your doctor has told you. Check with your doctor if you are not sure.

**Take Pradaxa as recommended for the following conditions:**

Prevention of blood clot formation after knee or hip replacement surgery

The recommended dose is 220 mg once a day (taken as 2 capsules of 110 mg).

If your kidney function is decreased by more than half or if you are 75 years of age or older, the recommended dose is 150 mg once a day (taken as 2 capsules of 75 mg).

If you are taking amiodarone-, quinidine- or verapamil-containing medicines the recommended dose is 150 mg once a day (taken as 2 capsules of 75 mg).

If you are taking verapamil containing medicines and your kidney function is decreased by more than half, you should be treated with a reduced dose of 75 mg Pradaxa because your bleeding risk may be increased.

After knee replacement surgery

You should start treatment with Pradaxa within 1-4 hours after surgery finishes, taking a single capsule. Thereafter two capsules once a day should be taken for a total of 10 days.

After hip replacement surgery

You should start treatment with Pradaxa within 1-4 hours after surgery finishes, taking a single capsule. Thereafter two capsules once a day should be taken for a total of 28-35 days.

For both surgery types, treatment should not be started if there is bleeding from the site of operation. If the treatment cannot be started until the day after surgery, dosing should be started with 2 capsules once daily.

Prevention of brain or body vessel obstruction by blood clot formation developing after abnormal heart beats and Treatment of blood clots in the veins of your legs and lungs including prevention of blood clots from re-occurring in the vein of your legs and lungs

The recommended dose is 300 mg taken as one 150 mg capsule twice a day.

If you are 80 years or older, the recommended dose of Pradaxa is 220 mg taken as one 110 mg capsule twice a day.

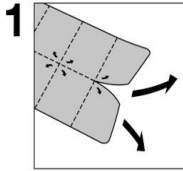
If you are taking verapamil-containing medicines, you should be treated with a reduced Pradaxa dose of 220 mg taken as one 110 mg capsule twice a day, because your bleeding risk may be increased.

If you have a potentially higher risk for bleeding, your doctor may decide to prescribe a dose of Pradaxa 220 mg taken as one 110 mg capsule twice a day.

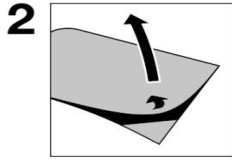
Pradaxa can be taken with or without food. The capsule should be swallowed whole with a glass of water, to ensure delivery to the stomach. Do not break, chew, or empty the pellets from the capsule since this may increase the risk of bleeding.

**When taking Pradaxa capsules out of the blister pack, please observe the following instructions**

The following pictogram illustrates how to take Pradaxa capsules out of the blister



Tear off one individual blister from the blister card along the perforated line



Peel off the backing foil and remove the capsule.

- do not push the capsules through the blister foil.
- do not peel off the blister foil until a capsule is required.

#### **When taking Pradaxa capsules out of the bottle, please observe the following instructions**

- push and turn for opening.
- after removing the capsule, place the cap back on the bottle and tightly close the bottle right away after you take your dose.

#### **Change of anticoagulant treatment**

- *Changing from treatment with Pradaxa to anticoagulant treatment given by injection:*

##### Prevention of blood clot formation after knee or hip replacement surgery

Do not start treatment with injectable anticoagulant medicines (for example, heparin) until 24 hours after the final dose of Pradaxa.

##### Prevention of brain or body vessel obstruction by blood clot formation developing after abnormal heart beats and treatment of blood clots in the veins of your legs and lungs including prevention of blood clots from re-occurring in the vein of your legs and lungs

Do not start treatment with injectable anticoagulant medicines (for example, heparin) until 12 hours after the final dose of Pradaxa.

- *Changing from anticoagulant treatment given by injection to treatment with Pradaxa:*  
Start taking Pradaxa 0-2 hours before the time you would have had the next injection.

##### Prevention of brain or body vessel obstruction by blood clot formation developing after abnormal heart beats and treatment of blood clots in the veins of your legs and lungs including prevention of blood clots from re-occurring in the vein of your legs and lungs

- *Changing from Pradaxa to blood thinners containing vitamin-K antagonists (e.g. phenprocoumon):*  
Your doctor needs to do blood-measurements and instruct you when to start vitamin-K antagonist treatment.

- *Changing from blood thinners containing vitamin-K antagonists (e.g. phenprocoumon) to Pradaxa:*

Stop taking the medicine containing a vitamin-K antagonist. Your doctor needs to do blood-measurements and instruct you when to start Pradaxa treatment.

### **If you take more Pradaxa than you should**

If you take more Pradaxa than recommended, you may have an increased risk of bleeding. Your doctor can perform a blood test to assess the risk of bleeding.

Inform your doctor immediately, if you take more than the prescribed dose of Pradaxa. If bleeding occurs, surgical treatment or treatment with blood transfusions may be required.

### **If you forget to take Pradaxa**

#### Prevention of blood clot formation after knee or hip replacement surgery

Continue with your remaining daily doses of Pradaxa at the same time of the next day.

Do not take a double dose to make up for a forgotten dose.

#### Prevention of brain or body vessel obstruction by blood clot formation developing after abnormal heart beats and treatment of blood clots in the veins of your legs and lungs including prevention of blood clots from re-occurring in the vein of your legs and lungs

A forgotten dose can still be taken up to 6 hours prior to the next due dose.

A missed dose should be omitted if the remaining time is below 6 hours prior to the next due dose.

Do not take a double dose to make up for a forgotten dose.

### **If you stop taking Pradaxa**

Take Pradaxa exactly as prescribed. Do not stop taking Pradaxa without first consulting your doctor. Stopping Pradaxa may increase the risk of developing a blood clot in patients treated after hip- or knee-replacement surgery or increase the risk of a brain or body vessel obstruction in patients with abnormal heart beats.

If you have any further questions on the use of this medicine, ask your doctor or pharmacist.

## **4. Possible side effects**

Like all medicines, this medicine can cause side effects, although not everybody gets them.

Pradaxa affects blood clotting, so most side effects are related to signs such as bruising or bleeding. Major or severe bleeding may occur, these constitute the most serious side effects and, regardless of location, may become disabling, life-threatening or even lead to death. In some cases these bleedings may not be obvious.

If you experience any bleeding event that does not stop by itself or if you experience signs of excessive bleeding (exceptional weakness, tiredness, paleness, dizziness, headache or unexplained swelling) consult your doctor immediately. Your doctor may decide to keep you under closer observation or change your medicine.

Tell your doctor immediately, if you experience a serious allergic reaction which causes difficulty in breathing or dizziness.

The side effects are listed below, grouped by how likely they are to happen.

#### Prevention of blood clot formation after knee or hip replacement surgery

Common (may affect up to 1 in 10 people):

- A fall in the amount of haemoglobin in the blood (the substance in the red blood cells)
- Unusual laboratory test results on liver function

Uncommon (may affect up to 1 in 100 people):

- Bleeding may happen from the nose, into the stomach or bowel, from penis/vagina or urinary tract (incl. blood in the urine that stains the urine pink or red), from piles, into the rectum, under the skin, into a joint, from or after an injury or after an operation

- Haematoma formation or bruising occurring after an operation
- Blood detected in the stools by a laboratory test
- A fall in the number of red cells in the blood
- A decrease in the proportion of red cells in the blood
- Allergic reaction
- Vomiting
- Frequent loose or liquid bowel movements
- Feeling sick
- Exudation of a small amount of liquid from the incision made for a surgical procedure
- Wound secretion (liquid exuding from the surgical wound)

Rare (may affect up to 1 in 1,000 people):

- Bleeding
- Bleeding may happen in the brain, from a surgical incision, from the site of entry of an injection or from the site of entry of a catheter into a vein
- Blood-stained discharge from the site of entry of a catheter into a vein
- Coughing of blood or blood stained sputum
- A fall in the number of platelets in the blood
- A fall in the number of red cells in the blood after an operation
- Serious allergic reaction which causes difficulty in breathing or dizziness
- Serious allergic reaction which causes swelling of the face or throat
- Skin rash notable for dark red, raised, itchy bumps caused by an allergic reaction
- Sudden change of the skin which affects its colour and appearance
- Itching
- Ulcer in the stomach or bowel (incl. ulcer in the gullet)
- Inflammation of the gullet and stomach
- Reflux of gastric juice into the gullet
- Belly ache or stomach ache
- Indigestion
- Difficulty in swallowing
- Fluid exiting a wound
- Fluid exiting a wound after an operation

Not known (frequency cannot be estimated from the available data):

- Difficulty in breathing or wheezing

#### Prevention of brain or body vessel obstruction by blood clot formation developing after abnormal heart beats

Common (may affect up to 1 in 10 people):

- Bleeding may happen from the nose, into the stomach or bowel, from penis/vagina or urinary tract (incl. blood in the urine that stains the urine pink or red), or under the skin
- A fall in the number of red cells in the blood
- Belly ache or stomach ache
- Indigestion
- Frequent loose or liquid bowel movements
- Feeling sick

Uncommon (may affect up to 1 in 100 people):

- Bleeding
- Bleeding may happen from piles, into the rectum, or in the brain.
- Haematoma formation
- Coughing of blood or blood stained sputum
- A fall in the number of platelets in the blood
- A fall in the amount of haemoglobin in the blood (the substance in the red blood cells)
- Allergic reaction
- Sudden change of the skin which affects its colour and appearance



- Itching
- Ulcer in the stomach or bowel (incl. ulcer in the gullet)
- Inflammation of the gullet and stomach
- Reflux of gastric juice into the gullet
- Vomiting
- Difficulty in swallowing
- Unusual laboratory test results on liver function

Rare (may affect up to 1 in 1,000 people):

- Bleeding may happen into a joint, from a surgical incision, from an injury, or from the site of entry of an injection or from the site of entry of a catheter into a vein
- Serious allergic reaction which causes difficulty in breathing or dizziness
- Serious allergic reaction which causes swelling of the face or throat
- Skin rash notable for dark red, raised, itchy bumps caused by an allergic reaction
- A decrease in the proportion of red cells in the blood
- Liver enzymes increased
- Yellowing of the skin or whites of the eyes, caused by liver or blood problems

Not known (frequency cannot be estimated from the available data):

- Difficulty in breathing or wheezing

In a clinical trial the rate of heart attacks with Pradaxa was numerically higher than with warfarin. The overall occurrence was low.

Treatment of blood clots in the veins of your legs and lungs including prevention of blood clots from re-occurring in the veins of your legs and/or lungs

Common (may affect up to 1 in 10 people):

- Bleeding may happen from the nose, into the stomach or bowel, into the rectum, from penis/vagina or urinary tract (incl. blood in the urine that stains the urine pink or red), or under the skin
- Indigestion

Uncommon (may affect up to 1 in 100 people):

- Bleeding
- Bleeding may happen into a joint or from an injury
- Bleeding may happen from piles and from haemorrhoids
- A fall in the number of red cells in the blood
- Haematoma formation
- Coughing of blood or blood stained sputum
- Allergic reaction
- Sudden change of the skin which affects its colour and appearance
- Itching
- Ulcer in the stomach or bowel
- Inflammation of the gullet and stomach
- Reflux of gastric juice into the gullet
- Feeling sick
- Vomiting
- Belly ache or stomach ache
- Frequent loose or liquid bowel movements
- Unusual laboratory test results on liver function
- Liver enzymes increased

Rare (may affect up to 1 in 1,000 people):

- Bleeding may happen, from a surgical incision, or from the site of entry of an injection or from the site of entry of a catheter into a vein or from the brain
- A fall in the number of platelets in the blood

- Serious allergic reaction which causes difficulty in breathing or dizziness
- Serious allergic reaction which causes swelling of the face or throat
- Skin rash notable for dark red, raised, itchy bumps caused by an allergic reaction
- Difficulty in swallowing
- A decrease in the proportion of red cells in the blood

Not known (frequency cannot be estimated from the available data):

- Difficulty in breathing or wheezing
- A fall in the amount of haemoglobin in the blood (the substance in the red blood cells)
- A fall in the number of red cells in the blood
- Yellowing of the skin or whites of the eyes, caused by liver or blood problems

In the trial program the rate of heart attacks with Pradaxa was higher than with warfarin. The overall occurrence was low. No imbalance in the rate of heart attacks was observed in patients treated with dabigatran versus patients treated with placebo.

### **Reporting of side effects**

If you get any side effects, talk to your doctor or pharmacist. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via [the national reporting system listed in Appendix V](#). By reporting side effects you can help provide more information on the safety of this medicine.

## **5. How to store Pradaxa**

Keep this medicine out of the sight and reach of children.

Do not use this medicine after the expiry date which is stated on the carton, blister or bottle after “EXP”. The expiry date refers to the last day of that month.

**Blister:** Store in the original package in order to protect from moisture. Do not put the capsules in pill boxes or pill organizers, unless capsules can be maintained in the original package.

**Bottle:** Once opened, the medicine must be used within 4 months. Keep the bottle tightly closed. Store in the original package in order to protect from moisture. Do not put the capsules in pill boxes or pill organizers.

## **6. Contents of the pack and other information**

### **What Pradaxa contains**

- The active substance is dabigatran, which is administered in the form of 110 mg dabigatran etexilate given as mesilate.
- The other ingredients are tartaric acid, acacia, hypromellose, dimeticone 350, talc, and hydroxypropylcellulose.
- The capsule shell contains carrageenan, potassium chloride, titanium dioxide, indigo carmine, and hypromellose.
- The black printing ink contains shellac, iron oxide black and potassium hydroxide.

### **What Pradaxa looks like and contents of the pack**

Pradaxa 110 mg are hard capsules with an opaque, light blue-coloured cap and an opaque, light blue-coloured body. The Boehringer Ingelheim logo is printed on the cap and “R110” on the body of the capsule.

Pradaxa is available in packs containing 10 x 1, 30 x 1, 60 x 1 a multipack containing 3 packs of 60 x 1 hard capsules (180 hard capsules) or a multipack containing 2 packs of 50 x 1 hard capsules (100 hard capsules) in aluminium perforated unit dose blisters. Furthermore, Pradaxa is available in packs containing 60 x 1 capsules in aluminium perforated unit dose white blisters.

Pradaxa 110 mg hard capsules are also available in polypropylene (plastic) bottles with 60 hard capsules.

Not all pack sizes may be marketed.

**Marketing Authorisation Holder**

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Germany

**Manufacturer**

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**This leaflet was last approved in**

Detailed information on this medicine is available on the European Medicines Agency web site:  
<http://www.ema.europa.eu/>

## Package leaflet: Information for the user

### Pradaxa 150 mg hard capsules dabigatran etexilate

**Read all of this leaflet carefully before you start taking this medicine because it contains important information for you.**

- Keep this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor or pharmacist.
- This medicine has been prescribed for you only. Do not pass it on to others. It may harm them, even if their signs of illness are the same as yours.
- If you get any side effects, talk to your doctor or pharmacist. This includes any possible side effects not listed in this leaflet. See section 4.

#### What is in this leaflet

1. What Pradaxa is and what it is used for
2. What you need to know before you take Pradaxa
3. How to take Pradaxa
4. Possible side effects
5. How to store Pradaxa
6. Contents of the pack and other information

#### 1. What Pradaxa is and what it is used for

Pradaxa is a medicine which contains the active substance dabigatran etexilate. It works by blocking a substance in the body which is involved in blood clot formation.

Pradaxa is a medicine which is used to reduce the risk of brain or body vessel obstruction by blood clot formation in adult patients with an abnormal heart beat (atrial fibrillation) and additional risk factors. Pradaxa is a blood thinner medicine that lowers the risk of blood clot formation.

Pradaxa is a medicine which is used to treat blood clots in the veins of your legs and lungs and to prevent blood clots from re-occurring in the vein of your legs and lungs

#### 2. What you need to know before you take Pradaxa

##### Do not take Pradaxa

- if you are allergic to dabigatran etexilate or any of the other ingredients of this medicine (listed in section 6).
- if you have severely reduced kidney function.
- if you are currently bleeding.
- if you have a disease in an organ of the body that increases the risk of serious bleeding.
- if you have an increased tendency to bleed. This may be inborn, of unknown cause or due to other medicines.
- if you have a severely reduced liver function or liver disease which could possibly cause death.
- if you are taking oral ketoconazole or itraconazole, medicines to treat fungal infections.
- if you are taking cyclosporine, a medicine to prevent organ rejection after transplantation.
- if you are taking dronedarone, a medicine used to prevent repetition of your problem of irregular heart beat.
- if you are taking medicines to prevent blood clotting (e.g. warfarin, rivaroxaban, apixaban or heparin), except when changing anticoagulant treatment or while having a venous or arterial line and you get heparin through this line to keep it open.
- if you have received an artificial heart valve

## Warnings and precautions

Talk to your doctor before taking Pradaxa. You may also need to talk to your doctor during treatment with Pradaxa if you experience symptoms or if you have to undergo surgery. Tell your doctor if you have or have had any medical conditions or illnesses, in particular any of those included in the following list:

- if you have a liver disease that is associated with changes in the blood tests, the use of Pradaxa is not recommended.
- if you have an increased bleeding risk, as could be the case in the following situations:
  - if you have been recently bleeding.
  - if you have had a surgical tissue removal (biopsy) in the past month.
  - if you have had a serious injury (e.g. a bone fracture, head injury or any injury requiring surgical treatment).
  - if you are suffering from an inflammation of the gullet or stomach.
  - if you have problems with reflux of gastric juice into the gullet.
  - if you are receiving medicines which could increase the risk of bleeding such as aspirin (acetylsalicylic acid), clopidogrel, ticagrelor.
  - if you are taking anti-inflammatory medicines such as diclofenac, ibuprofen, piroxicam.
  - if you are suffering from an infection of the heart (bacterial endocarditis).
  - if you know you have impaired kidney function, or you are suffering from dehydration (symptoms include feeling thirsty and passing reduced amounts of dark-coloured (concentrated) urine).
  - if you are older than 75 years.
  - if you weigh 50 kg or less.
- if you have had a heart attack or if you have been diagnosed with conditions that increase the risk to develop a heart attack.
- if you undergo a planned surgery. Pradaxa will need to be stopped temporarily due to an increased bleeding risk during and shortly after an operation. If possible, Pradaxa should be stopped at least 24 hours before an operation. In patients with a higher risk for bleeding your doctor may decide to stop treatment earlier.
- if you need to undergo an unplanned surgery. If possible, a surgery should be delayed until at least 12 hours after the last dose. If surgery cannot be delayed, there may be an increased risk of bleeding. Your doctor will consider this risk of bleeding together with the urgency of the surgery.
- if you have a tube (catheters) inserted into the back:  
A tube can be inserted into your back e.g. for anaesthesia or pain relief during or after surgery. If you are administered Pradaxa after removal of a catheter, your doctor will examine you regularly.
- if you fall or injure yourself during treatment, especially if you hit your head, please seek urgent medical attention. You may need to be checked by a doctor, as you may be at increased risk of bleeding.

## Children and adolescents

Pradaxa should not be used in children and adolescents below 18 years old.

## Other medicines and Pradaxa

Tell your doctor or pharmacist if you are taking, have recently taken or might take any other medicines. For instance:

- Medicines to reduce blood clotting (e.g. warfarin, phenprocoumon, heparin, clopidogrel, prasugrel, ticagrelor, rivaroxaban)
- Anti-inflammatory and pain reliever medicines (e.g. aspirine)
- St. John's wort, a herbal medicine for depression
- Antidepressant medicines called selective serotonin re-uptake inhibitors or serotonin-norepinephrine re-uptake inhibitors
- Rifampicin or clarithromycin, two antibiotics
- Medicines to treat abnormal heart beats (e.g. Amiodarone, dronedarone, quinidine, verapamil)

If you are taking verapamil-containing medicines, you should be treated with a reduced Pradaxa dose of 220 mg taken as one 110 mg capsule twice a day, because your bleeding risk may be increased. Pradaxa and verapamil-containing medicines should be taken at the same time.

- Medicines to treat fungal infections (e.g. ketoconazole, itraconazole, posaconazole), unless they are only applied to the skin
- Medicines to prevent organ rejection after transplantation (e.g. tacrolimus, cyclosporine)
- Anti-viral medicines for AIDS (e.g. ritonavir)
- Medicines for treatment of epilepsy (e.g. carbamazepine, phenytoin)

## Pregnancy and breast-feeding

The effects of Pradaxa on pregnancy and the unborn child are not known. You should not take Pradaxa if you are pregnant unless your doctor advises you that it is safe to do so. If you are a woman of child-bearing age, you should avoid becoming pregnant while you are taking Pradaxa.

You should not breast-feed while you are taking Pradaxa.

## Driving and using machines

Pradaxa has no known effects on the ability to drive or use machines.

## 3. How to take Pradaxa

Always take this medicine exactly as your doctor has told you. Check with your doctor if you are not sure.

The recommended dose is 300 mg taken as one 150 mg capsule twice a day.

If you are 80 years or older, the recommended dose of Pradaxa is 220 mg taken as one 110 mg capsule twice daily.

If you are taking verapamil-containing medicines, you should be treated with a reduced Pradaxa dose of 220 mg taken as one 110 mg capsule twice a day, because your bleeding risk may be increased.

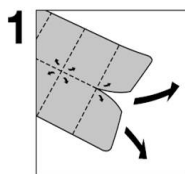
If you have a potentially higher risk for bleeding, your doctor may decide to prescribe a dose of Pradaxa 220 mg taken as one 110 mg capsule twice a day.

Pradaxa can be taken with or without food. The capsule should be swallowed whole with a glass of water, to ensure delivery to the stomach. Do not break, chew, or empty the pellets from the capsule since this may increase the risk of bleeding.

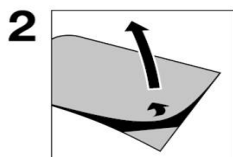


## When taking Pradaxa capsules out of the blister pack, please observe the following instructions

The following pictogram illustrates how to take Pradaxa capsules out of the blister



Tear off one individual blister from the blister card along the perforated line



Peel off the backing foil and remove the capsule.

- do not push the capsules through the blister foil.
- do not peel off the blister foil until a capsule is required.

## When taking Pradaxa capsules out of the bottle, please observe the following instructions

- push and turn for opening.
- after removing the capsule, place the cap back on the bottle and tightly close the bottle right away after you take your dose.

## Change of anticoagulant treatment

- *Changing from treatment with Pradaxa to anticoagulant treatment given by injection:*  
Do not start treatment with injectable anticoagulant medicines (for example, heparin) until 12 hours after the final dose of Pradaxa.
- *Changing from anticoagulant treatment given by injection to treatment with Pradaxa:*  
Start taking Pradaxa 0-2 hours before the time you would have had the next injection.
- *Changing from Pradaxa to blood thinners containing vitamin-K antagonists (e.g. phenprocoumon):*  
Your doctor needs to do blood-measurements and instruct you when to start vitamin-K antagonist treatment.
- *Changing from blood thinners containing vitamin-K antagonists (e.g. phenprocoumon) to Pradaxa:*  
Stop taking the medicine containing a vitamin-K antagonist. Your doctor needs to do blood-measurements and instruct you when to start Pradaxa treatment.

## If you take more Pradaxa than you should

If you take more Pradaxa than recommended, you may have an increased risk of bleeding. Your doctor can perform a blood test to assess the risk of bleeding.

Inform your doctor immediately, if you take more than the prescribed dose of Pradaxa. If bleeding occurs, surgical treatment or treatment with blood transfusions may be required.

## If you forget to take Pradaxa

A forgotten dose can still be taken up to 6 hours prior to the next due dose.

A missed dose should be omitted if the remaining time is below 6 hours prior to the next due dose.

Do not take a double dose to make up for a forgotten dose.

### **If you stop taking Pradaxa**

Take Pradaxa exactly as prescribed. Do not stop taking Pradaxa without first consulting your doctor. Stopping Pradaxa may increase the risk of a brain or body vessel obstruction in patients with abnormal heart beats.

If you have any further questions on the use of this medicine, ask your doctor or pharmacist.

### **4. Possible side effects**

Like all medicines, this medicine can cause side effects, although not everybody gets them.

Pradaxa affects blood clotting, so most side effects are related to signs such as bruising or bleeding. Major or severe bleeding may occur, these constitute the most serious side effects and, regardless of location, may become disabling, life-threatening or even lead to death. In some cases these bleedings may not be obvious.

If you experience any bleeding event that does not stop by itself or if you experience signs of excessive bleeding (exceptional weakness, tiredness, paleness, dizziness, headache or unexplained swelling) consult your doctor immediately. Your doctor may decide to keep you under closer observation or change your medicine.

Tell your doctor immediately, if you experience a serious allergic reaction which causes difficulty in breathing or dizziness.

The side effects are listed below, grouped by how likely they are to happen.

#### Prevention of brain or body vessel obstruction by blood clot formation developing after abnormal heart beats

Common (may affect up to 1 in 10 people):

- Bleeding may happen from the nose, into the stomach or bowel, from penis/vagina or urinary tract (incl. blood in the urine that stains the urine pink or red), or under the skin
- A fall in the number of red cells in the blood
- Belly ache or stomach ache
- Indigestion
- Frequent loose or liquid bowel movements
- Feeling sick

Uncommon (may affect up to 1 in 100 people):

- Bleeding
- Bleeding may happen from piles, into the rectum, or in the brain.
- Haematoma formation
- Coughing of blood or blood stained sputum
- A fall in the number of platelets in the blood
- A fall in the amount of haemoglobin in the blood (the substance in the red blood cells)
- Allergic reaction
- Sudden change of the skin which affects its colour or appearance
- Itching
- Ulcer in the stomach or bowel (incl. ulcer in the gullet)
- Inflammation of the gullet and stomach
- Reflux of gastric juice into the gullet
- Vomiting
- Difficulty in swallowing
- Unusual laboratory test results on liver function

Rare (may affect up to 1 in 1,000 people):

- Bleeding may happen into a joint, from a surgical incision, from an injury, from the site of entry of an injection or from the site of entry of a catheter into a vein
- Serious allergic reaction which causes difficulty in breathing or dizziness
- Serious allergic reaction which causes swelling of the face or throat
- Skin rash notable for dark red, raised, itchy bumps caused by an allergic reaction
- A decrease in the proportion of red cells in the blood
- Liver enzymes increased
- Yellowing of the skin or whites of the eyes, caused by liver or blood problems

Not known (frequency cannot be estimated from the available data):

- Difficulty in breathing or wheezing

In a clinical trial the rate of heart attacks with Pradaxa was numerically higher than with warfarin. The overall occurrence was low.

#### Treatment of blood clots in the veins of your legs and lungs including prevention of blood clots from re-occurring in the veins of your legs and/or lungs

Common (may affect up to 1 in 10 people):

- Bleeding may happen from the nose, into the stomach or bowel, into the rectum, from penis/vagina or urinary tract (incl. blood in the urine that stains the urine pink or red), or under the skin
- Indigestion

Uncommon (may affect up to 1 in 100 people):

- Bleeding
- Bleeding may happen into a joint or from an injury
- Bleeding may happen from piles and from haemorrhoids#
- A fall in the number of red cells in the blood
- Haematoma formation
- Coughing of blood or blood stained sputum
- Allergic reaction
- Sudden change of the skin which affects its colour and appearance
- Itching
- Ulcer in the stomach or bowel
- Inflammation of the gullet and stomach
- Reflux of gastric juice into the gullet
- Feeling sick
- Vomiting
- Belly ache or stomach ache
- Frequent loose or liquid bowel movements
- Unusual laboratory test results on liver function
- Liver enzymes increased

Rare (may affect up to 1 in 1,000 people):

- Bleeding may happen, from a surgical incision, or from the site of entry of an injection or from the site of entry of a catheter into a vein or from the brain
- A fall in the number of platelets in the blood
- Serious allergic reaction which causes difficulty in breathing or dizziness
- Serious allergic reaction which causes swelling of the face or throat
- Skin rash notable for dark red, raised, itchy bumps caused by an allergic reaction
- Difficulty in swallowing
- A decrease in the proportion of red cells in the blood

Not known (frequency cannot be estimated from the available data):

- Difficulty in breathing or wheezing

- A fall in the amount of haemoglobin in the blood (the substance in the red blood cells)
- A fall in the number of red cells in the blood
- Yellowing of the skin or whites of the eyes, caused by liver or blood problems

In the trial program the rate of heart attacks with Pradaxa was higher than with warfarin. The overall occurrence was low. No imbalance in the rate of heart attacks was observed in patients treated with dabigatran versus patients treated with placebo.

### **Reporting of side effects**

If you get any side effects, talk to your doctor or pharmacist. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via [the national reporting system listed in Appendix V](#). By reporting side effects you can help provide more information on the safety of this medicine.

## **5. How to store Pradaxa**

Keep this medicine out of the sight and reach of children.

Do not use this medicine after the expiry date which is stated on the carton, blister or bottle after “EXP”. The expiry date refers to the last day of that month.

Blister: Store in the original package in order to protect from moisture. Do not put the capsules in pill boxes or pill organizers, unless capsules can be maintained in the original package.

Bottle: Once opened, the medicine must be used within 4 months. Keep the bottle tightly closed. Store in the original package in order to protect from moisture. Do not put the capsules in pill boxes or pill organizers.

## **6. Contents of the pack and other information**

### **What Pradaxa contains**

- The active substance is dabigatran, which is administered in the form of 150 mg dabigatran etexilate given as mesilate.
- The other ingredients are tartaric acid, acacia, hypromellose, dimeticone 350, talc, and hydroxypropylcellulose.
- The capsule shell contains carrageenan, potassium chloride, titanium dioxide, indigo carmine, and hypromellose.
- The black printing ink contains shellac, iron oxide black and potassium hydroxide.

### **What Pradaxa looks like and contents of the pack**

Pradaxa 150 mg are hard capsules with an opaque, light blue-coloured cap and an opaque, white body. The Boehringer Ingelheim logo is printed on the cap and “R150” on the body of the capsule.

Pradaxa is available in packs containing 10 x 1, 30 x 1, 60 x 1 a multipack containing 3 packs of 60 x 1 hard capsules (180 hard capsules) or a multipack containing 2 packs of 50 x 1 hard capsules (100 hard capsules) in aluminium perforated unit dose blisters. Furthermore, Pradaxa is available in packs containing 60 x 1 capsules in aluminium perforated unit dose white blisters.

Pradaxa 150 mg hard capsules are also available in polypropylene (plastic) bottles with 60 hard capsules.

Not all pack sizes may be marketed.

**Marketing Authorisation Holder**

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Germany

**Manufacturer**

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and

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**This leaflet was last approved in**

Detailed information on this medicine is available on the European Medicines Agency web site:  
<http://www.ema.europa.eu/>

## PATIENT ALERT CARD

### Table of Content

Pradaxa<sup>®</sup>  
Dabigatran etexilate

- Keep this card with you at all times
- Make sure to use the latest version

[xxxx 201x]  
[Boehringer Ingelheim logo]

### Dear Patient,

Your doctor has initiated treatment with Pradaxa<sup>®</sup> (dabigatran etexilate). In order to use Pradaxa<sup>®</sup> safely, please consider the important information inside.

As this patient alert card contains important information about your treatment, please carry this card with you at all times to inform healthcare professionals about your intake of Pradaxa<sup>®</sup>.

[Pradaxa logo]

### Pradaxa<sup>®</sup> Information for Patients

- Follow your doctor's instructions when taking Pradaxa<sup>®</sup>.
- Pradaxa<sup>®</sup> makes your blood less "sticky", prevents clot formation and reduces your risk of suffering from a stroke or other complications.
- However, this may increase the risk of bleeding.
- In case of a bleeding event which does not stop spontaneously, immediately inform your doctor.
- In the case of bleeding, please contact your doctor before stopping the intake of Pradaxa<sup>®</sup>.
- If you fall or injure yourself during treatment, especially if you hit your head, please seek urgent medical attention. You may need to be checked by a doctor, as you may be at increased risk of bleeding.
- Signs and symptoms of bleeding events might be haematoma of the skin, tar stools, blood in urine, nose bleed, etc.
- If surgical or invasive procedures need to be performed, inform the treating physician about your intake of Pradaxa<sup>®</sup> prior to the intervention.
- Do not stop the intake of Pradaxa<sup>®</sup> without talking to your doctor.
- Take Pradaxa<sup>®</sup> regularly as instructed and do not miss a dose.
- Inform your doctor about all medicines you are currently taking.
- Pradaxa<sup>®</sup> can be taken with or without food. The capsule should be swallowed whole with a glass of water, to ensure delivery to the stomach. Do not break, chew, or empty the pellets from the capsule since this may increase the risk of bleeding.

### Pradaxa<sup>®</sup> Information for Healthcare Professionals

- Pradaxa<sup>®</sup> is an oral anticoagulant acting by direct thrombin inhibition.
- In case of surgical or other invasive procedure, Pradaxa<sup>®</sup> needs to be stopped in advance (for details, see Summary of Product Characteristics).
- In case of major bleeding events, Pradaxa<sup>®</sup> must be stopped immediately.
- Since Pradaxa<sup>®</sup> is eliminated predominantly by the kidneys, adequate diuresis must be maintained. Pradaxa<sup>®</sup> is dialyzable.
- A specific reversal agent (Praxbind<sup>®</sup>) is available (for details and more advice to reverse the anticoagulant effect of Pradaxa<sup>®</sup>, see Summary of Product Characteristics of Pradaxa<sup>®</sup> and Praxbind<sup>®</sup>).



**Please complete this section or ask your doctor to do it.**

**Patient Information**

\_\_\_\_\_  
Name of the patient

\_\_\_\_\_  
Date of birth

\_\_\_\_\_  
Indication for anticoagulation

\_\_\_\_\_  
Dosage of Pradaxa®