

## SUMMARY OF PRODUCT CHARACTERISTICS

### 1. NAME OF THE MEDICINAL PRODUCT

Rivaroxaban Denk 2,5 mg, filmomhulde tabletten

### 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each film-coated tablet contains 2.5 mg rivaroxaban.

#### Excipient with known effect

Each film-coated tablet contains 23.9 mg lactose monohydrate, see section 4.4.

For the full list of excipients, see section 6.1.

### 3. PHARMACEUTICAL FORM

Film-coated tablet.

Yellow, round, biconvex film-coated tablet, engraved with “RVX” on one side, plain on the other with a diameter of 6.1 mm approximately.

### 4. CLINICAL PARTICULARS

#### 4.1 Therapeutic indications

[Product Name], co-administered with acetylsalicylic acid (ASA) alone or with ASA plus clopidogrel or ticlopidine, is indicated for the prevention of atherothrombotic events in adult patients after an acute coronary syndrome (ACS) with elevated cardiac biomarkers (see sections 4.3, 4.4 and 5.1).

#### 4.2 Posology and method of administration

##### Posology

The recommended dose is 2.5 mg twice daily.

Patients taking [Product name] 2.5 mg twice daily should also take a daily dose of 75 – 100 mg ASA or a daily dose of 75 – 100 mg ASA in addition to either a daily dose of 75 mg clopidogrel or a standard daily dose of ticlopidine.

Treatment should be regularly evaluated in the individual patient weighing the risk for ischaemic events against the bleeding risks. Extension of treatment beyond 12 months should be done on an individual patient basis as experience up to 24 months is limited (see section 5.1).

Treatment with [Product Name] should be started as soon as possible after stabilisation of the ACS event (including revascularisation procedures); at the earliest 24 hours after admission to hospital and at the time when parenteral anticoagulation therapy would normally be discontinued.

#### *Co-administration with antiplatelet therapy*

In patients with an acute thrombotic event or vascular procedure and a need for dual antiplatelet therapy, the continuation of [Product Name] 2.5 mg twice daily should be evaluated depending on the type of event or procedure and antiplatelet regimen.

Safety and efficacy of [Product Name] 2.5 mg twice daily in combination with dual antiplatelet therapy have been studied in patients

- with recent ACS in combination with ASA plus clopidogrel/ticlopidine (see section 4.1)

#### *Missed dose*

If a dose is missed the patient should continue with the regular dose as recommended at the next scheduled time. The dose should not be doubled to make up for a missed dose.

#### *Converting from Vitamin K Antagonists (VKA) to rivaroxaban*

When converting patients from VKAs to rivaroxaban, International Normalised Ratio (INR) values could be falsely elevated after the intake of rivaroxaban. The INR is not valid to measure the anticoagulant activity of rivaroxaban, and therefore should not be used (see section 4.5).

#### *Converting from rivaroxaban to Vitamin K antagonists (VKA)*

There is a potential for inadequate anticoagulation during the transition from rivaroxaban to VKA.

Continuous adequate anticoagulation should be ensured during any transition to an alternate anticoagulant. It should be noted that rivaroxaban can contribute to an elevated INR.

In patients converting from rivaroxaban to VKA, VKA should be given concurrently until the INR is  $\geq 2.0$ .

For the first two days of the conversion period, standard initial dosing of VKA should be used followed by VKA dosing, as guided by INR testing. While patients are on both rivaroxaban and VKA the INR should not be tested earlier than 24 hours after the previous dose but prior to the next dose of rivaroxaban. Once [Product Name] is discontinued INR testing may be done reliably at least 24 hours after the last dose (see sections 4.5 and 5.2).

#### *Converting from parenteral anticoagulants to rivaroxaban*

For patients currently receiving a parenteral anticoagulant, discontinue the parenteral anticoagulant and start rivaroxaban 0 to 2 hours before the time that the next scheduled administration of the parenteral medicinal product (e.g. low molecular weight heparins) would be due or at the time of discontinuation of a continuously administered parenteral medicinal product (e.g. intravenous unfractionated heparin).

#### *Converting from rivaroxaban to parenteral anticoagulants*

Give the first dose of parenteral anticoagulant at the time the next rivaroxaban dose would be taken.

### Special populations

#### *Renal impairment*

Limited clinical data for patients with severe renal impairment (creatinine clearance 15 – 29 ml/min) indicate that rivaroxaban plasma concentrations are significantly increased. Therefore, [Product Name] is to be used with caution in these patients. Use is not recommended in patients with creatinine clearance < 15 ml/min (see sections 4.4 and 5.2). No dose adjustment is necessary in patients with mild renal impairment (creatinine clearance 50 – 80 ml/min) or moderate renal impairment (creatinine clearance 30 – 49 ml/min) (see section 5.2).

#### *Hepatic impairment*

[Product Name] is contraindicated in patients with hepatic disease associated with coagulopathy and clinically relevant bleeding risk including cirrhotic patients with Child Pugh B and C (see sections 4.3 and 5.2).

#### *Elderly population*

No dose adjustment (see sections 4.4 and 5.2)

The risk of bleeding increases with increasing age (see section 4.4).

#### *Body weight*

No dose adjustment (see sections 4.4 and 5.2)

#### *Gender*

No dose adjustment (see section 5.2)

#### *Paediatric population*

The safety and efficacy of rivaroxaban in children aged 0 to 18 years have not been established. No data are available. Therefore, [Product Name] is not recommended for use in children below 18 years of age.

### Method of administration

For oral use.

[Product Name] 2.5 mg film-coated tablets can be taken with or without food (see sections 4.5 and 5.2).

For patients who are unable to swallow whole film-coated tablets, [Product Name] film-coated tablets may be crushed and mixed with water or apple puree immediately prior to use and administered orally.

The crushed [Product Name] film-coated tablet may also be given through gastric tubes after confirmation of the correct gastric placement of the tube. The crushed film-coated tablet should be administered in a small amount of water via a gastric tube after which it should be flushed with water (see section 5.2).

### **4.3 Contraindications**

Hypersensitivity to the active substance or to any of the excipients listed in section 6.1.

Active clinically significant bleeding.

Lesion or condition, if considered to be a significant risk 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, dabigatran etexilate, 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).

Concomitant treatment of ACS with antiplatelet therapy in patients with a prior stroke or a transient ischaemic attack (TIA) (see section 4.4).

Concomitant treatment of CAD/PAD with ASA in patients with previous haemorrhagic or lacunar stroke, or any stroke within a month (see section 4.4).

Hepatic disease associated with coagulopathy and clinically relevant bleeding risk including cirrhotic patients with Child Pugh B and C (see section 5.2).

Pregnancy and breast-feeding (see section 4.6).

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

In ACS patients, efficacy and safety of rivaroxaban 2.5 mg twice daily have been investigated in combination with the antiplatelet agents ASA alone or ASA plus clopidogrel/ticlopidine.

Treatment in combination with other antiplatelet agents, e.g. prasugrel or ticagrelor, has not been studied and is not recommended.

Clinical surveillance in line with anticoagulation practice is recommended throughout the treatment period.

##### Haemorrhagic risk

As with other anticoagulants, patients taking [Product Name] are to be carefully observed for signs of bleeding.

It is recommended to be used with caution in conditions with increased risk of haemorrhage. [Product Name] administration should be discontinued if severe haemorrhage occurs (see section 4.9).

In the clinical studies mucosal bleedings (i.e. epistaxis, gingival, gastrointestinal, genito urinary including abnormal vaginal or increased menstrual bleeding) and anaemia were seen more frequently during long term rivaroxaban treatment on top of single or dual anti-platelet therapy. Thus, in addition to adequate clinical surveillance, laboratory testing of haemoglobin/haematocrit could be of value to detect occult bleeding and quantify the clinical relevance of overt bleeding, as judged to be appropriate.

Several sub-groups of patients, as detailed below, are at increased risk of bleeding. Therefore, the use of [Product Name] in combination with dual antiplatelet therapy in patients at known increased risk for bleeding should be balanced against the benefit in terms of prevention of atherothrombotic events. In addition these patients are to be carefully monitored for signs and

symptoms of bleeding complications and anaemia after initiation of treatment (see section 4.8).

Any unexplained fall in haemoglobin or blood pressure should lead to a search for a bleeding site.

Although treatment with rivaroxaban does not require routine monitoring of exposure, rivaroxaban levels measured with a calibrated quantitative anti-factor Xa assay may be useful in exceptional situations where knowledge of rivaroxaban exposure may help to inform clinical decisions, e.g. overdose and emergency surgery (see sections 5.1 and 5.2).

#### Renal impairment

In patients with severe renal impairment (creatinine clearance < 30 ml/min) rivaroxaban plasma levels may be significantly increased (1.6 fold on average) which may lead to an increased bleeding risk.

[Product Name] is to be used with caution in patients with creatinine clearance 15 – 29 ml/min. Use is not recommended in patients with creatinine clearance < 15 ml/min (see sections 4.2 and 5.2).

In patients with moderate renal impairment (creatinine clearance 30 – 49 ml/min) concomitantly receiving other medicinal products which increase rivaroxaban plasma concentrations [Product Name] is to be used with caution (see section 4.5).

#### Interaction with other medicinal products

The use of [Product Name] is not recommended in patients receiving concomitant systemic treatment with azole-antimycotics (such as ketoconazole, itraconazole, voriconazole and posaconazole) or HIV protease inhibitors (e.g. ritonavir). These active substances are strong inhibitors of both CYP3A4 and P-gp and therefore may increase rivaroxaban plasma concentrations to a clinically relevant degree (2.6 fold on average) which may lead to an increased bleeding risk (see section 4.5).

Care is to be taken if patients are treated concomitantly with medicinal products affecting haemostasis such as non-steroidal anti-inflammatory medicinal products (NSAIDs), acetylsalicylic acid (ASA) and platelet aggregation inhibitors or selective serotonin reuptake inhibitors (SSRIs) and serotonin norepinephrine reuptake inhibitors (SNRIs). For patients at risk of ulcerative gastrointestinal disease an appropriate prophylactic treatment may be considered (see sections 4.5 and 5.1).

Patients treated with [Product Name] and antiplatelet agents should only receive concomitant treatment with NSAIDs if the benefit outweighs the bleeding risk.

#### Other haemorrhagic risk factors

As with other antithrombotics, rivaroxaban is not recommended in patients with an increased bleeding risk such as:

- congenital or acquired bleeding disorders
- uncontrolled severe arterial hypertension
- other gastrointestinal disease without active ulceration that can potentially lead to bleeding complications (e.g. inflammatory bowel disease, oesophagitis, gastritis and gastroesophageal reflux disease)
- vascular retinopathy
- bronchiectasis or history of pulmonary bleeding

It should be used with caution in ACS patients:

- $\geq 75$  years of age if co-administered with ASA alone or with ASA plus clopidogrel or ticlopidine. The benefit-risk of the treatment should be individually assessed on a regular basis.
- with lower body weight ( $< 60$  kg) if co-administered with ASA alone or with ASA plus clopidogrel or ticlopidine.

#### Patients with cancer

Patients with malignant disease may simultaneously be at higher risk of bleeding and thrombosis. The individual benefit of antithrombotic treatment should be weighed against risk for bleeding in patients with active cancer dependent on tumour location, antineoplastic therapy and stage of disease. Tumours located in the gastrointestinal or genitourinary tract have been associated with an increased risk of bleeding during rivaroxaban therapy.

In patients with malignant neoplasms at high risk of bleeding, the use of rivaroxaban is contraindicated (see section 4.3).

#### Patients with prosthetic valves

Rivaroxaban should not be used for thromboprophylaxis in patients having recently undergone transcatheter aortic valve replacement (TAVR). Safety and efficacy of rivaroxaban have not been studied in patients with prosthetic heart valves; therefore, there are no data to support that rivaroxaban provides adequate anticoagulation in this patient population. Treatment with rivaroxaban is not recommended for these patients.

#### Patients with antiphospholipid syndrome

Direct acting Oral Anticoagulants (DOACs) including rivaroxaban are not recommended for patients with a history of thrombosis who are diagnosed with antiphospholipid syndrome. In particular for patients that are triple positive (for lupus anticoagulant, anticardiolipin antibodies, and anti-beta 2-glycoprotein I antibodies), treatment with DOACs could be associated with increased rates of recurrent thrombotic events compared with vitamin K antagonist therapy.

#### Patients with prior stroke and/or TIA

##### Patients with ACS

[Product Name] 2.5 mg is contraindicated for the treatment of ACS in patients with a prior stroke or TIA (see section 4.3). Few ACS patients with a prior stroke or TIA have been studied but the limited efficacy data available indicate that these patients do not benefit from treatment.

##### Patients with CAD/PAD

CAD/PAD patients with previous haemorrhagic or lacunar stroke, or an ischaemic, non-lacunar stroke with in the previous month were not studied (see section 4.3).

Patients after recent revascularisation procedures of the lower limb due to symptomatic PAD with a previous stroke or TIA were not studied. Treatment with rivaroxaban 2.5 mg should be avoided in these patients receiving dual antiplatelet therapy.

##### Spinal/epidural anaesthesia or puncture

When neuraxial anaesthesia (spinal/epidural anaesthesia) or spinal/epidural puncture is employed, patients treated with antithrombotic agents for prevention of thromboembolic complications are at risk of developing an epidural or spinal haematoma which can result in long-term or permanent paralysis.

The risk of these events may be increased by the post-operative use of indwelling epidural catheters or the concomitant use of medicinal products affecting haemostasis. The risk may also be increased by traumatic or repeated epidural or spinal puncture. Patients are to be frequently monitored for signs and symptoms of neurological impairment (e.g. numbness or weakness of the legs, bowel or bladder dysfunction). If neurological compromise is noted, urgent diagnosis and treatment is necessary. Prior to neuraxial intervention the physician should consider the potential benefit versus the risk in anticoagulated patients or in patients to be anticoagulated for thromboprophylaxis. There is no clinical experience with the use of rivaroxaban 2.5 mg and antiplatelet agents in these situations. Platelet aggregation inhibitors should be discontinued as suggested by the manufacturer's prescribing information.

To reduce the potential risk of bleeding associated with the concurrent use of rivaroxaban and neuraxial (epidural/spinal) anaesthesia or spinal puncture, consider the pharmacokinetic profile of rivaroxaban. Placement or removal of an epidural catheter or lumbar puncture is best performed when the anticoagulant effect of rivaroxaban is estimated to be low (see section 5.2). However, the exact timing to reach a sufficiently low anticoagulant effect in each patient is not known.

#### Dosing recommendations before and after invasive procedures and surgical intervention

If an invasive procedure or surgical intervention is required, [Product Name] 2.5 mg should be stopped at least 12 hours before the intervention, if possible and based on the clinical judgement of the physician. If a patient is to undergo elective surgery and anti-platelet effect is not desired, platelet aggregation inhibitors should be discontinued as directed by the manufacturer's prescribing information.

If the procedure cannot be delayed the increased risk of bleeding should be assessed against the urgency of the intervention.

[Product Name] should be restarted as soon as possible after the invasive procedure or surgical intervention provided the clinical situation allows and adequate haemostasis has been established as determined by the treating physician (see section 5.2).

#### Elderly population

Increasing age may increase haemorrhagic risk (see sections 5.1 and 5.2).

#### Dermatological reactions

Serious skin reactions, including Stevens-Johnson syndrome/toxic epidermal necrolysis and DRESS syndrome, have been reported during post-marketing surveillance in association with the use of rivaroxaban (see section 4.8). Patients appear to be at highest risk for these reactions early in the course of therapy: the onset of the reaction occurring in the majority of cases within the first weeks of treatment. Rivaroxaban should be discontinued at the first appearance of a severe skin rash (e.g. spreading, intense and/or blistering), or any other sign of hypersensitivity in conjunction with mucosal lesions.

#### **Other excipients**

Patients with rare hereditary problems of galactose intolerance, total lactase deficiency or glucose-galactose malabsorption should not take this medicine.

This medicine contains less than 1 mmol sodium (23 mg) per film-coated tablet, that is to say essentially "sodium-free".

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

### CYP3A4 and P-gp inhibitors

Co-administration of rivaroxaban with ketoconazole (400 mg once a day) or ritonavir (600 mg twice a day) led to a 2.6 fold / 2.5 fold increase in mean rivaroxaban AUC and a 1.7 fold / 1.6 fold increase in mean rivaroxaban  $C_{max}$ , with significant increases in pharmacodynamic effects which may lead to an increased bleeding risk. Therefore, the use of [Product Name] is not recommended in patients receiving concomitant systemic treatment with azole-antimycotics such as ketoconazole, itraconazole, voriconazole and posaconazole or HIV protease inhibitors. These active substances are strong inhibitors of both CYP3A4 and P-gp (see section 4.4).

Active substances strongly inhibiting only one of the rivaroxaban elimination pathways, either CYP3A4 or P-gp, are expected to increase rivaroxaban plasma concentrations to a lesser extent.

Clarithromycin (500 mg twice a day), for instance, considered as a strong CYP3A4 inhibitor and moderate P-gp inhibitor, led to a 1.5 fold increase in mean rivaroxaban AUC and a 1.4 fold increase in  $C_{max}$ . The interaction with clarithromycin is likely not clinically relevant in most patients but can be potentially significant in high-risk patients. (For patients with renal impairment: see section 4.4).

Erythromycin (500 mg three times a day), which inhibits CYP3A4 and P-gp moderately, led to a 1.3 fold increase in mean rivaroxaban AUC and  $C_{max}$ . The interaction with erythromycin is likely not clinically relevant in most patients but can be potentially significant in high-risk patients.

In subjects with mild renal impairment erythromycin (500 mg three times a day) led to a 1.8 fold increase in mean rivaroxaban AUC and 1.6 fold increase in  $C_{max}$  when compared to subjects with normal renal function. In subjects with moderate renal impairment, erythromycin led to a 2.0 fold increase in mean rivaroxaban AUC and 1.6 fold increase in  $C_{max}$  when compared to subjects with normal renal function. The effect of erythromycin is additive to that of renal impairment (see section 4.4).

Fluconazole (400 mg once daily), considered as a moderate CYP3A4 inhibitor, led to a 1.4 fold increase in mean rivaroxaban AUC and a 1.3 fold increase in mean  $C_{max}$ . The interaction with fluconazole is likely not clinically relevant in most patients but can be potentially significant in high-risk patients. (For patients with renal impairment: see section 4.4).

Given the limited clinical data available with dronedarone, co-administration with rivaroxaban should be avoided.

### Anticoagulants

After combined administration of enoxaparin (40 mg single dose) with rivaroxaban (10 mg single dose) an additive effect on anti-factor Xa activity was observed without any additional effects on clotting tests (PT, aPTT). Enoxaparin did not affect the pharmacokinetics of rivaroxaban.

Due to the increased bleeding risk care is to be taken if patients are treated concomitantly with any other anticoagulants (see sections 4.3 and 4.4).



### NSAIDs/platelet aggregation inhibitors

No clinically relevant prolongation of bleeding time was observed after concomitant administration of rivaroxaban (15 mg) and 500 mg naproxen. Nevertheless, there may be individuals with a more pronounced pharmacodynamic response.

No clinically significant pharmacokinetic or pharmacodynamic interactions were observed when rivaroxaban was co-administered with 500 mg acetylsalicylic acid.

Clopidogrel (300 mg loading dose followed by 75 mg maintenance dose) did not show a pharmacokinetic interaction with rivaroxaban (15 mg) but a relevant increase in bleeding time was observed in a subset of patients which was not correlated to platelet aggregation, P-selectin or GPIIb/IIIa receptor levels.

Care is to be taken if patients are treated concomitantly with NSAIDs (including acetylsalicylic acid) and platelet aggregation inhibitors because these medicinal products typically increase the bleeding risk (see section 4.4).

### SSRIs/SNRIs

As with other anticoagulants the possibility may exist that patients are at increased risk of bleeding in case of concomitant use with SSRIs or SNRIs due to their reported effect on platelets. When concomitantly used in the rivaroxaban clinical programme, numerically higher rates of major or non-major clinically relevant bleeding were observed in all treatment groups.

### Warfarin

Converting patients from the vitamin K antagonist warfarin (INR 2.0 to 3.0) to rivaroxaban (20 mg) or from rivaroxaban (20 mg) to warfarin (INR 2.0 to 3.0) increased prothrombin time/INR (Neoplastin) more than additively (individual INR values up to 12 may be observed), whereas effects on aPTT, inhibition of factor Xa activity and endogenous thrombin potential were additive.

If it is desired to test the pharmacodynamic effects of rivaroxaban during the conversion period, antifactor Xa activity, PiCT, and Heptest can be used as these tests were not affected by warfarin. On the fourth day after the last dose of warfarin, all tests (including PT, aPTT, inhibition of factor Xa activity and ETP) reflected only the effect of rivaroxaban.

If it is desired to test the pharmacodynamic effects of warfarin during the conversion period, INR measurement can be used at the  $C_{\text{trough}}$  of rivaroxaban (24 hours after the previous intake of rivaroxaban) as this test is minimally affected by rivaroxaban at this time point.

No pharmacokinetic interaction was observed between warfarin and rivaroxaban.

### CYP3A4 inducers

Co-administration of rivaroxaban with the strong CYP3A4 inducer rifampicin led to an approximate 50 % decrease in mean rivaroxaban AUC, with parallel decreases in its pharmacodynamic effects. The concomitant use of rivaroxaban with other strong CYP3A4 inducers (e.g. phenytoin, carbamazepine, phenobarbital or St. John's Wort (*Hypericum perforatum*)) may also lead to reduced rivaroxaban plasma concentrations. Therefore, concomitant administration of strong CYP3A4 inducers should be avoided unless the patient is closely observed for signs and symptoms of thrombosis.

#### Other concomitant therapies

No clinically significant pharmacokinetic or pharmacodynamic interactions were observed when rivaroxaban was co-administered with midazolam (substrate of CYP3A4), digoxin (substrate of P-gp), atorvastatin (substrate of CYP3A4 and P-gp) or omeprazole (proton pump inhibitor). Rivaroxaban neither inhibits nor induces any major CYP isoforms like CYP3A4.

No clinically relevant interaction with food was observed (see section 4.2).

#### Laboratory parameters

Clotting parameters (e.g. PT, aPTT, HepTest) are affected as expected by the mode of action of rivaroxaban (see section 5.1).

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

#### Pregnancy

Safety and efficacy of rivaroxaban have not been established in pregnant women. Studies in animals have shown reproductive toxicity (see section 5.3). Due to the potential reproductive toxicity, the intrinsic risk of bleeding and the evidence that rivaroxaban passes the placenta, [Product Name] is contraindicated during pregnancy (see section 4.3).

Women of child-bearing potential should avoid becoming pregnant during treatment with rivaroxaban.

#### Breast-feeding

Safety and efficacy of rivaroxaban have not been established in breast-feeding women. Data from animals indicate that rivaroxaban is secreted into milk. Therefore [Product Name] is contraindicated during breast-feeding (see section 4.3). A decision must be made whether to discontinue breast-feeding or to discontinue/abstain from therapy.

#### Fertility

No specific studies with rivaroxaban in humans have been conducted to evaluate effects on fertility. In a study on male and female fertility in rats no effects were seen (see section 5.3).

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

Rivaroxaban has minor influence on the ability to drive and use machines. Adverse reactions like syncope (frequency: uncommon) and dizziness (frequency: common) have been reported (see section 4.8).

Patients experiencing these adverse reactions should not drive or use machines.

## 4.8 Undesirable effects

### Summary of the safety profile

The safety of rivaroxaban has been evaluated in thirteen pivotal phase III studies (see Table 1).

**Table 1: Number of patients studied, total daily dose and maximum treatment duration in phase III studies**

<b>Indication</b>	<b>Number of patients*</b>	<b>Total daily dose</b>	<b>Maximum treatment duration</b>
Prevention of venous thromboembolism (VTE) in adult patients undergoing elective hip or knee replacement surgery	6,097	10 mg	39 days
Prevention of VTE in medically ill patients	3,997	10 mg	39 days
Treatment of deep vein thrombosis (DVT), pulmonary embolism (PE) and prevention of recurrence	6,790	Day 1 - 21: 30 mg Day 22 and onwards: 20 mg After at least 6 months: 10 mg or 20 mg	21 months
Prevention of stroke and systemic embolism in patients with non-valvular atrial fibrillation	7,750	20 mg	41 months
Prevention of atherothrombotic events in patients after an ACS	10,225	5 mg or 10 mg respectively, co-administered with either ASA or ASA plus clopidogrel or ticlopidine	31 months
Prevention of atherothrombotic events in patients with CAD/PAD	18,244	5 mg co-administered with ASA or 10 mg alone	47 months

\* Patients exposed to at least one dose of rivaroxaban

The most commonly reported adverse reactions in patients receiving rivaroxaban were bleedings (see section 4.4. and ‘Description of selected adverse reactions’ below) (Table 2). The most commonly reported bleedings were epistaxis (4.5 %) and gastrointestinal tract haemorrhage (3.8 %).

**Table 2: Bleeding\* and anaemia events rates in patients exposed to rivaroxaban across the completed phase III studies**

<b>Indication</b>	<b>Any bleeding</b>	<b>Anaemia</b>
Prevention of venous thromboembolism (VTE) in adult patients undergoing elective hip or knee replacement surgery	6.8 % of patients	5.9 % of patients
Prevention of venous thromboembolism in medically ill patients	12.6 % of patients	2.1 % of patients
Treatment of DVT, PE and prevention of recurrence	23 % of patients	1.6 % of patients
Prevention of stroke and systemic embolism in patients with non-valvular atrial fibrillation	28 per 100 patient years	2.5 per 100 patient years
Prevention of atherothrombotic events in patients after an ACS	22 per 100 patient years	1.4 per 100 patient years
Prevention of atherothrombotic events in patients with CAD/PAD	6.7 per 100 patient years	0.15 per 100 patient years**

\* For all rivaroxaban studies all bleeding events are collected, reported and adjudicated.

\*\* In the COMPASS study, there is a low anaemia incidence as a selective approach to adverse event collection was applied

#### Tabulated list of adverse reactions

The frequencies of adverse reactions reported with rivaroxaban are summarised in Table 3 below by system organ class (in MedDRA) and by frequency.

Frequencies are defined as: 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 3: All adverse reactions reported in patients in phase III clinical studies or through post-marketing use\***

<b>Common</b>	<b>Uncommon</b>	<b>Rare</b>	<b>Very rare</b>	<b>Not known</b>
<b>Blood and lymphatic system disorders</b>				
Anaemia (incl. respective laboratory parameters)	Thrombocytosis (incl. platelet count increased) <sup>A</sup> , Thrombocytopenia			
<b>Immune system disorders</b>				
	Allergic reaction, dermatitis allergic, Angioedema and allergic oedema		Anaphylactic reactions including anaphylactic shock	
<b>Nervous system disorders</b>				
Dizziness, headache	Cerebral and intracranial haemorrhage, syncope			

Common	Uncommon	Rare	Very rare	Not known
<b>Eye disorders</b>				
Eye haemorrhage (incl. conjunctival haemorrhage)				
<b>Cardiac disorders</b>				
	Tachycardia			
<b>Vascular disorders</b>				
Hypotension, haematoma				
<b>Respiratory, thoracic and mediastinal disorders</b>				
Epistaxis, haemoptysis			Eosinophilic pneumonia	
<b>Gastrointestinal disorders</b>				
Gingival bleeding, gastrointestinal tract haemorrhage (incl. rectal haemorrhage), gastrointestinal and abdominal pains, dyspepsia, nausea, constipation <sup>A</sup> , diarrhoea, vomiting <sup>A</sup>	Dry mouth			
<b>Hepatobiliary disorders</b>				
Increase in transaminases	Hepatic impairment, Increased bilirubin, increased blood alkaline phosphatase <sup>A</sup> , increased GGT <sup>A</sup>	Jaundice, Bilirubin conjugated increased (with or without concomitant increase of ALT), Cholestasis, Hepatitis (incl. hepatocellular injury)		
<b>Skin and subcutaneous tissue disorders</b>				
Pruritus (incl. uncommon cases of generalised pruritus), rash, ecchymosis, cutaneous and subcutaneous haemorrhage	Urticaria		Stevens-Johnson syndrome/ Toxic Epidermal Necrolysis, DRESS syndrome	
<b>Musculoskeletal and connective tissue disorders</b>				
Pain in extremity <sup>A</sup>	Haemarthrosis	Muscle haemorrhage		Compartment syndrome secondary to a bleeding
<b>Renal and urinary disorders</b>				
Urogenital tract haemorrhage (incl. haematuria and				Renal failure/acute renal failure

Common	Uncommon	Rare	Very rare	Not known
menorrhagia <sup>B</sup> ), renal impairment (incl. blood creatinine increased, blood urea increased)				secondary to a bleeding sufficient to cause hypoperfusion, Anticoagulant-related nephropathy
<b>General disorders and administration site conditions</b>				
Fever <sup>A</sup> , peripheral oedema, decreased general strength and energy (incl. fatigue and asthenia)	Feeling unwell (incl. malaise)	Localised oedema <sup>A</sup>		
<b>Investigations</b>				
	Increased LDH <sup>A</sup> , increased lipase <sup>A</sup> , increased amylase <sup>A</sup>			
<b>Injury, poisoning and procedural complications</b>				
Postprocedural haemorrhage (incl. postoperative anaemia, and wound haemorrhage), contusion, wound secretion <sup>A</sup>		Vascular pseudoaneurysm <sup>C</sup>		

A: observed in prevention of VTE in adult patients undergoing elective hip or knee replacement surgery

B: observed in treatment of DVT, PE and prevention of recurrence as very common in women < 55 years

C: observed as uncommon in prevention of atherothrombotic events in patients after an ACS (following percutaneous coronary intervention)

\* A pre-specified selective approach to adverse event collection was applied in selected phase III studies. The incidence of adverse reactions did not increase and no new adverse drug reaction was identified after analysis of these studies.

#### Description of selected adverse reactions

Due to the pharmacological mode of action, the use of rivaroxaban may be associated with an increased risk of occult or overt bleeding from any tissue or organ which may result in post haemorrhagic anaemia. The signs, symptoms and severity (including fatal outcome) will vary according to the location and degree or extent of the bleeding and/or anaemia (see section 4.9 “Management of bleeding”). In the clinical studies mucosal bleedings (i.e. epistaxis, gingival, gastrointestinal, genito urinary including abnormal vaginal or increased menstrual bleeding) and anaemia were seen more frequently during long term rivaroxaban treatment compared with VKA treatment. Thus, in addition to adequate clinical surveillance, laboratory testing of haemoglobin/haematocrit could be of value to detect occult bleeding and quantify the clinical relevance of overt bleeding, as judged to be appropriate. The risk of bleedings may be increased in certain patient groups, e.g. those patients with uncontrolled severe arterial hypertension and/or on concomitant treatment affecting haemostasis (see section 4.4

“Haemorrhagic risk”). Menstrual bleeding may be intensified and/or prolonged. Haemorrhagic complications may present as weakness, paleness, dizziness, headache or unexplained swelling, dyspnoea and unexplained shock. In some cases as a consequence of anaemia, symptoms of cardiac ischaemia like chest pain or angina pectoris have been observed.

Known complications secondary to severe bleeding such as compartment syndrome and renal failure due to hypoperfusion, or anticoagulant-related nephropathy have been reported for rivaroxaban. Therefore, the possibility of haemorrhage is to be considered in evaluating the condition in any anticoagulated patient.

#### 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. [To be completed nationally].

## **4.9 Overdose**

Rare cases of overdose up to 1,960 mg have been reported. In case of overdose, the patient should be observed carefully for bleeding complications or other adverse reactions (see section “Management of bleeding”). Due to limited absorption a ceiling effect with no further increase in average plasma exposure is expected at supratherapeutic doses of 50 mg rivaroxaban or above.

A specific reversal agent (andexanet alfa) antagonising the pharmacodynamic effect of rivaroxaban is available (refer to the Summary of Product Characteristics of andexanet alfa). The use of activated charcoal to reduce absorption in case of rivaroxaban overdose may be considered.

#### Management of bleeding

Should a bleeding complication arise in a patient receiving rivaroxaban, the next rivaroxaban administration should be delayed or treatment should be discontinued as appropriate.

Rivaroxaban has a half-life of approximately 5 to 13 hours (see section 5.2). Management should be individualised according to the severity and location of the haemorrhage.

Appropriate symptomatic treatment could be used as needed, such as mechanical compression (e.g. for severe epistaxis), surgical haemostasis with bleeding control procedures, fluid replacement and haemodynamic support, blood products (packed red cells or fresh frozen plasma, depending on associated anaemia or coagulopathy) or platelets.

If bleeding cannot be controlled by the above measures, either the administration of a specific factor Xa inhibitor reversal agent (andexanet alfa), which antagonises the pharmacodynamic effect of rivaroxaban, or a specific procoagulant agent, such as prothrombin complex concentrate (PCC), activated prothrombin complex concentrate (APCC) or recombinant factor VIIa (r-FVIIa), should be considered. However, there is currently very limited clinical experience with the use of these medicinal products in individuals receiving rivaroxaban. The recommendation is also based on limited non-clinical data. Re-dosing of recombinant factor VIIa shall be considered and titrated depending on improvement of bleeding.

Depending on local availability, a consultation with a coagulation expert should be considered in case of major bleedings (see section 5.1).

Protamine sulphate and vitamin K are not expected to affect the anticoagulant activity of rivaroxaban.

There is limited experience with tranexamic acid and no experience with aminocaproic acid and aprotinin in individuals receiving rivaroxaban. There is neither scientific rationale for benefit nor experience with the use of the systemic haemostatic desmopressin in individuals receiving rivaroxaban. Due to the high plasma protein binding rivaroxaban is not expected to be dialysable.

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: Antithrombotic agents, direct factor Xa inhibitors,  
ATC code: B01AF01

#### Mechanism of action

Rivaroxaban is a highly selective direct factor Xa inhibitor with oral bioavailability. Inhibition of factor Xa interrupts the intrinsic and extrinsic pathway of the blood coagulation cascade, inhibiting both thrombin formation and development of thrombi. Rivaroxaban does not inhibit thrombin (activated factor II) and no effects on platelets have been demonstrated.

#### Pharmacodynamic effects

Dose-dependent inhibition of factor Xa activity was observed in humans. Prothrombin time (PT) is influenced by rivaroxaban in a dose dependent way with a close correlation to plasma concentrations (r value equals 0.98) if Neoplastin is used for the assay. Other reagents would provide different results.

The readout for PT is to be done in seconds, because the INR is only calibrated and validated for coumarins and cannot be used for any other anticoagulant.

In a clinical pharmacology study on the reversal of rivaroxaban pharmacodynamics in healthy adult subjects (n=22), the effects of single doses (50 IU/kg) of two different types of PCCs, a 3-factor PCC (Factors II, IX and X) and a 4-factor PCC (Factors II, VII, IX and X) were assessed. The 3-factor PCC reduced mean Neoplastin PT values by approximately 1.0 second within 30 minutes, compared to reductions of approximately 3.5 seconds observed with the 4-factor PCC. In contrast, the 3-factor PCC had a greater and more rapid overall effect on reversing changes in endogenous thrombin generation than the 4-factor PCC (see section 4.9).

The activated partial thromboplastin time (aPTT) and HepTest are also prolonged dose-dependently; however, they are not recommended to assess the pharmacodynamic effect of rivaroxaban. There is no need for monitoring of coagulation parameters during treatment with rivaroxaban in clinical routine.

However, if clinically indicated, rivaroxaban levels can be measured by calibrated quantitative antifactor-Xa tests (see section 5.2).

#### Clinical efficacy and safety



The rivaroxaban clinical programme was designed to demonstrate the efficacy of rivaroxaban for the prevention of cardiovascular (CV) death, myocardial infarction (MI) or stroke in subjects with a recent ACS (ST-elevation myocardial infarction [STEMI], non-ST-elevation myocardial infarction [NSTEMI] or unstable angina [UA]). In the pivotal double-blind ATLAS ACS 2 TIMI 51 study, 15,526 patients were randomly assigned in a 1:1:1 fashion to one of three treatment groups: rivaroxaban 2.5 mg orally twice daily, 5 mg orally twice daily or to placebo twice daily co-administered with ASA alone or with ASA plus a thienopyridine (clopidogrel or ticlopidine). Patients with an ACS under the age of 55 had to have either diabetes mellitus or a previous MI. The median time on treatment was 13 months and overall treatment duration was up to almost 3 years. 93.2 % of patients received ASA concomitantly plus thienopyridine treatment and 6.8 % ASA only. Among patients receiving dual anti-platelets therapy 98.8 % received clopidogrel, 0.9 % received ticlopidine and 0.3 % received prasugrel. Patients received the first dose of rivaroxaban at a minimum of 24 hours and up to 7 days (mean 4.7 days) after admission to the hospital, but as soon as possible after stabilisation of the ACS event, including revascularisation procedures and when parenteral anticoagulation therapy would normally be discontinued.

Both the 2.5 mg twice daily and the 5 mg twice daily regimens of rivaroxaban were effective in further reducing the incidence of CV events on a background of standard antiplatelet care. The 2.5 mg twice daily regimen reduced mortality, and there is evidence that the lower dose had lower bleeding risks, therefore rivaroxaban 2.5 mg twice daily co-administered with acetylsalicylic acid (ASA) alone or with ASA plus clopidogrel or ticlopidine is recommended for the prevention of atherothrombotic events in adult patients after an ACS with elevated cardiac biomarkers.

Relative to placebo, rivaroxaban significantly reduced the primary composite endpoint of CV death, MI or stroke. The benefit was driven by a reduction in CV death and MI and appeared early with a constant treatment effect over the entire treatment period (see Table 4 and Figure 1). Also the first secondary endpoint (all-cause death, MI or stroke) was reduced significantly. An additional retrospective analysis showed a nominally significant reduction in the incidence rates of stent thrombosis compared with placebo (see Table 4). The incidence rates for the principal safety outcome (non-coronary artery bypass graft (CABG) TIMI major bleeding events) were higher in patients treated with rivaroxaban than in patients who received placebo (see Table 6). However the incidence rates were balanced between rivaroxaban and placebo for the components of fatal bleeding events, hypotension requiring treatment with intravenous inotropic agents and surgical intervention for ongoing bleeding.

In Table 5 the efficacy results of patients undergoing percutaneous coronary intervention (PCI) are presented. The safety results in this subgroup of patients undergoing PCI were comparable to the overall safety results.

Patients with elevated biomarkers (troponin or CK-MB) and without a prior stroke/TIA constituted 80 % of the study population. The results of this patient population were also consistent with the overall efficacy and safety results.

**Table 4: Efficacy results from phase III ATLAS ACS 2 TIMI 51**

<b>Study population</b>	<b>Patients with a recent acute coronary syndrome<sup>a)</sup></b>	
Treatment dose	Rivaroxaban 2.5 mg, twice daily, N=5,114 n (%) Hazard Ratio (HR) (95 % CI) p-value <sup>b)</sup>	Placebo N=5,113 n (%)
Cardiovascular death, MI or stroke	313 (6.1 %) 0.84 (0.72, 0.97) p = 0.020*	376 (7.4 %)
All-cause death, MI or stroke	320 (6.3 %) 0.83 (0.72, 0.97) p = 0.016*	386 (7.5 %)
Cardiovascular death	94 (1.8 %) 0.66 (0.51, 0.86) p = 0.002**	143 (2.8 %)
All-cause death	103 (2.0 %) 0.68 (0.53, 0.87) p = 0.002**	153 (3.0 %)
MI	205 (4.0 %) 0.90 (0.75, 1.09) p = 0.270	229 (4.5 %)
Stroke	46 (0.9 %) 1.13 (0.74, 1.73) p = 0.562	41 (0.8 %)
Stent thrombosis	61 (1.2 %) 0.70 (0.51, 0.97) p = 0.033**	87 (1.7 %)

a) modified intent to treat analysis set (intent to treat total analysis set for stent thrombosis)

b) vs. placebo; Log-Rank p-value

\* statistically superior

\*\* nominally significant

**Table 5: Efficacy results from phase III ATLAS ACS 2 TIMI 51 in patients undergoing PCI**

<b>Study population</b>	<b>Patients with recent acute coronary syndrome undergoing PCI<sup>a)</sup></b>	
Treatment dose	Rivaroxaban 2.5 mg, twice daily, N=3114 n (%) HR (95 % CI) p-value <sup>b)</sup>	Placebo N=3096 n (%)
Cardiovascular death, MI or stroke	153 (4.9 %) 0.94 (0.75, 1.17) p = 0.572	165 (5.3 %)
Cardiovascular death	24 (0.8 %) 0.54 (0.33, 0.89) p = 0.013**	45 (1.5 %)
All-cause death	31 (1.0 %) 0.64 (0.41, 1.01) p = 0.053	49 (1.6 %)
MI	115 (3.7 %) 1.03 (0.79, 1.33) p = 0.829	113 (3.6 %)
Stroke	27 (0.9 %) 1.30 (0.74, 2.31) p = 0.360	21 (0.7 %)
Stent thrombosis	47 (1.5 %) 0.66 (0.46, 0.95) p = 0.026**	71 (2.3 %)

a) modified intent to treat analysis set (intent to treat total analysis set for stent thrombosis)

b) vs. placebo; Log-Rank p-value

\*\* nominally significant

**Table 6: Safety results from phase III ATLAS ACS 2 TIMI 51**

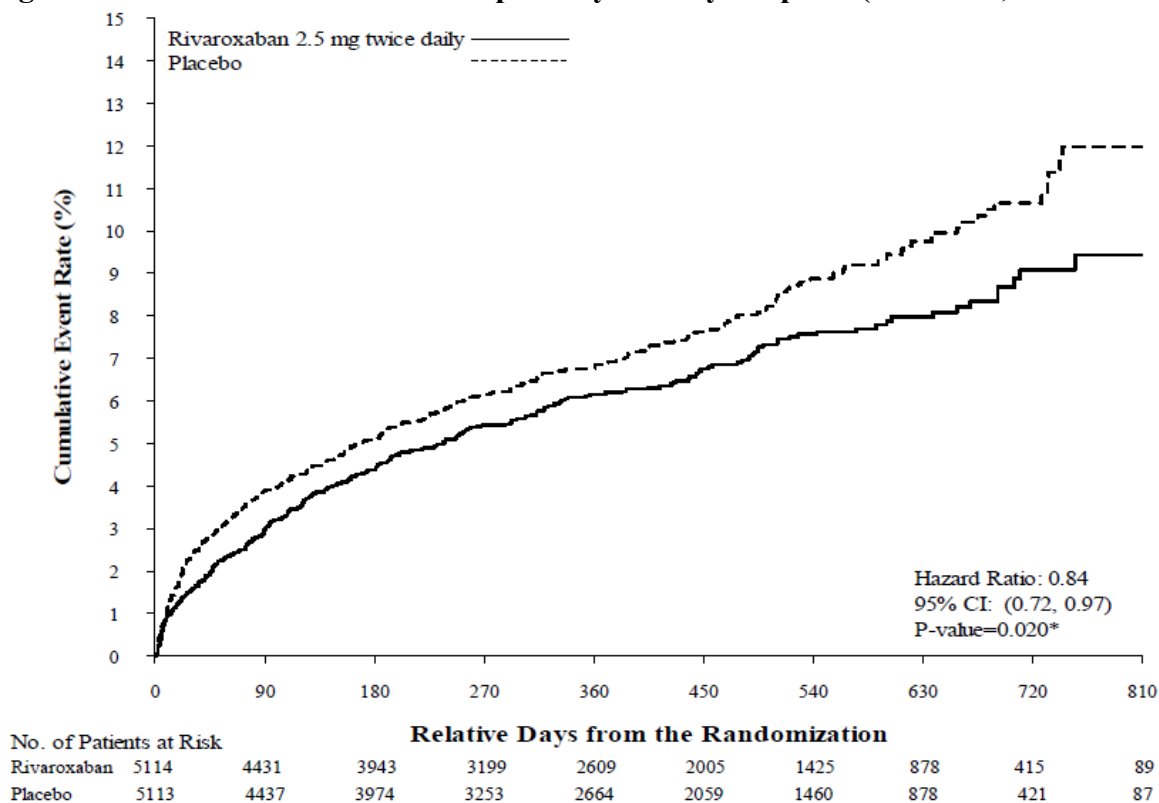
Study population	Patients with recent acute coronary syndrome <sup>a)</sup>	
Treatment dose	Rivaroxaban 2.5 mg, twice daily, N=5,115 n (%) HR (95 % CI) p-value <sup>b)</sup>	Placebo N=5,125 n(%)
Non-CABG TIMI major bleeding event	65 (1.3 %) 3.46 (2.08, 5.77) p = < 0.001*	19 (0.4 %)
Fatal bleeding event	6 (0.1 %) 0.67 (0.24, 1.89) p = 0.450	9 (0.2 %)
Symptomatic intracranial haemorrhage	14 (0.3 %) 2.83 (1.02, 7.86) p = 0.037	5 (0.1 %)
Hypotension requiring treatment with intravenous inotropic agents	3 (0.1 %)	3 (0.1 %)
Surgical intervention for ongoing bleeding	7 (0.1 %)	9 (0.2 %)
Transfusion of 4 or more units of blood over a 48 hour period	19 (0.4 %)	6 (0.1 %)

a) safety population, on treatment

b) vs. placebo; Log-Rank p-value

\* statistically significant

**Figure 1: Time to first occurrence of primary efficacy endpoint (CV death, MI or stroke)**



### Patients with high risk triple positive antiphospholipid syndrome

In an investigator sponsored, randomized open-label multicenter study with blinded endpoint adjudication, rivaroxaban was compared to warfarin in patients with a history of thrombosis, diagnosed with antiphospholipid syndrome and at high risk for thromboembolic events (positive for all 3 antiphospholipid tests: lupus anticoagulant, anticardiolipin antibodies, and anti-beta 2-glycoprotein I antibodies). The study was terminated prematurely after the enrolment of 120 patients due to an excess of events among patients in the rivaroxaban arm. Mean follow-up was 569 days. 59 patients were randomized to rivaroxaban 20 mg (15 mg for patients with creatinine clearance (CrCl) <50 mL/min) and 61 to warfarin (INR 2.0- 3.0). Thromboembolic events occurred in 12 % of patients randomized to rivaroxaban (4 ischaemic strokes and 3 myocardial infarctions). No events were reported in patients randomized to warfarin. Major bleeding occurred in 4 patients (7 %) of the rivaroxaban group and 2 patients (3 %) of the warfarin group.

### Paediatric population

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

## **5.2 Pharmacokinetic properties**

### Absorption

Rivaroxaban is rapidly absorbed with maximum concentrations ( $C_{max}$ ) appearing 2 - 4 hours after tablet intake.

Oral absorption of rivaroxaban is almost complete and oral bioavailability is high (80 - 100 %) for the 2.5 mg and 10 mg tablet dose, irrespective of fasting/fed conditions. Intake with food does not affect rivaroxaban AUC or  $C_{max}$  at the 2.5 mg and 10 mg dose. Rivaroxaban 2.5 mg and 10 mg tablets can be taken with or without food.

Rivaroxaban pharmacokinetics are approximately linear up to about 15 mg once daily. At higher doses rivaroxaban displays dissolution limited absorption with decreased bioavailability and decreased absorption rate with increased dose. This is more marked in fasting state than in fed state. Variability in rivaroxaban pharmacokinetics is moderate with inter-individual variability (CV %) ranging from 30 % to 40 %.

Absorption of rivaroxaban is dependent on the site of its release in the gastrointestinal tract. A 29 % and 56 % decrease in AUC and  $C_{max}$  compared to tablet was reported when rivaroxaban granulate is released in the proximal small intestine. Exposure is further reduced when rivaroxaban is released in the distal small intestine, or ascending colon. Therefore, administration of rivaroxaban distal to the stomach should be avoided since this can result in reduced absorption and related rivaroxaban exposure.

Bioavailability (AUC and  $C_{max}$ ) was comparable for 20 mg rivaroxaban administered orally as a crushed tablet mixed in apple puree, or suspended in water and administered via a gastric tube followed by a liquid meal, compared to a whole tablet. Given the predictable, dose-proportional pharmacokinetic profile of rivaroxaban, the bioavailability results from this study are likely applicable to lower rivaroxaban doses.

### Distribution

Plasma protein binding in humans is high at approximately 92 % to 95 %, with serum albumin being the main binding component. The volume of distribution is moderate with  $V_{ss}$  being approximately 50 litres.

### Biotransformation and elimination

Of the administered rivaroxaban dose, approximately 2/3 undergoes metabolic degradation, with half then being eliminated renally and the other half eliminated by the faecal route. The final 1/3 of the administered dose undergoes direct renal excretion as unchanged active substance in the urine, mainly via active renal secretion.

Rivaroxaban is metabolised via CYP3A4, CYP2J2 and CYP-independent mechanisms. Oxidative degradation of the morpholinone moiety and hydrolysis of the amide bonds are the major sites of biotransformation. Based on *in vitro* investigations rivaroxaban is a substrate of the transporter proteins P-gp (P-glycoprotein) and Bcrp (breast cancer resistance protein).

Unchanged rivaroxaban is the most important compound in human plasma, with no major or active circulating metabolites being present. With a systemic clearance of about 10 l/h, rivaroxaban can be classified as a low-clearance substance. After intravenous administration of a 1 mg dose the elimination half-life is about 4.5 hours. After oral administration the elimination becomes absorption rate limited. Elimination of rivaroxaban from plasma occurs with terminal half-lives of 5 to 9 hours in young individuals, and with terminal half-lives of 11 to 13 hours in the elderly.

### Special populations

#### *Gender*

There were no clinically relevant differences in pharmacokinetics and pharmacodynamics between male and female patients.

#### *Elderly population*

Elderly patients exhibited higher plasma concentrations than younger patients, with mean AUC values being approximately 1.5 fold higher, mainly due to reduced (apparent) total and renal clearance. No dose adjustment is necessary.

#### *Different weight categories*

Extremes in body weight (< 50 kg or > 120 kg) had only a small influence on rivaroxaban plasma concentrations (less than 25 %). No dose adjustment is necessary.

#### *Inter-ethnic differences*

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

#### *Hepatic impairment*

Cirrhotic patients with mild hepatic impairment (classified as Child Pugh A) exhibited only minor changes in rivaroxaban pharmacokinetics (1.2 fold increase in rivaroxaban AUC on average), nearly comparable to their matched healthy control group. In cirrhotic patients with moderate hepatic impairment (classified as Child Pugh B), rivaroxaban mean AUC was significantly increased by 2.3 fold compared to healthy volunteers. Unbound AUC was increased 2.6 fold. These patients also had reduced renal elimination of rivaroxaban, similar to patients with moderate renal impairment.

There are no data in patients with severe hepatic impairment.

The inhibition of factor Xa activity was increased by a factor of 2.6 in patients with moderate hepatic impairment as compared to healthy volunteers; prolongation of PT was similarly increased by a factor of 2.1. Patients with moderate hepatic impairment were more sensitive to rivaroxaban resulting in a steeper PK/PD relationship between concentration and PT.

Rivaroxaban is contraindicated in patients with hepatic disease associated with coagulopathy and clinically relevant bleeding risk, including cirrhotic patients with Child Pugh B and C (see section 4.3).

#### *Renal impairment*

There was an increase in rivaroxaban exposure correlated to decrease in renal function, as assessed via creatinine clearance measurements. In individuals with mild (creatinine clearance 50 - 80 ml/min), moderate (creatinine clearance 30 - 49 ml/min) and severe (creatinine clearance 15 - 29 ml/min) renal impairment, rivaroxaban plasma concentrations (AUC) were increased 1.4, 1.5 and 1.6 fold respectively. Corresponding increases in pharmacodynamic effects were more pronounced. In individuals with mild, moderate and severe renal impairment the overall inhibition of factor Xa activity was increased by a factor of 1.5, 1.9 and 2.0 respectively as compared to healthy volunteers; prolongation of PT was similarly increased by a factor of 1.3, 2.2 and 2.4 respectively. There are no data in patients with creatinine clearance < 15 ml/min.

Due to the high plasma protein binding rivaroxaban is not expected to be dialysable.

Use is not recommended in patients with creatinine clearance < 15 ml/min. Rivaroxaban is to be used with caution in patients with creatinine clearance 15 - 29 ml/min (see section 4.4).

#### Pharmacokinetic data in patients

In patients receiving rivaroxaban 2.5 mg twice daily for the prevention of atherothrombotic events in patients with ACS the geometric mean concentration (90 % prediction interval) 2 - 4 h and about 12 h after dose (roughly representing maximum and minimum concentrations during the dose interval) was 47 (13 - 123) and 9.2 (4.4 - 18) mcg/l, respectively.

#### Pharmacokinetic/pharmacodynamic relationship

The pharmacokinetic/pharmacodynamic (PK/PD) relationship between rivaroxaban plasma concentration and several PD endpoints (factor-Xa inhibition, PT, aPTT, Heptest) has been evaluated after administration of a wide range of doses (5 - 30 mg twice a day). The relationship between rivaroxaban concentration and factor-Xa activity was best described by an  $E_{max}$  model. For PT, the linear intercept model generally described the data better. Depending on the different PT reagents used, the slope differed considerably. When Neoplastin PT was used, baseline PT was about 13 s and the slope was around 3 to 4 s/(100 mcg/l). The results of the PK/PD analyses in Phase II and III were consistent with the data established in healthy subjects.

#### Paediatric population

Safety and efficacy have not been established for children and adolescents up to 18 years.

### **5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on conventional studies of safety pharmacology, single dose toxicity, phototoxicity, genotoxicity, carcinogenic potential and juvenile toxicity.

Effects observed in repeat-dose toxicity studies were mainly due to the exaggerated pharmacodynamic activity of rivaroxaban. In rats, increased IgG and IgA plasma levels were seen at clinically relevant exposure levels.

In rats, no effects on male or female fertility were seen. Animal studies have shown reproductive toxicity related to the pharmacological mode of action of rivaroxaban (e.g. haemorrhagic complications). Embryo-foetal toxicity (post-implantation loss, retarded/progressed ossification, hepatic multiple light coloured spots) and an increased incidence of common malformations as well as placental changes were observed at clinically relevant plasma concentrations. In the pre- and postnatal study in rats, reduced viability of the offspring was observed at doses that were toxic to the dams.

## **6. PHARMACEUTICAL PARTICULARS**

### **6.1 List of excipients**

#### Tablet core

Hypromellose (E464)  
Sodium laurilsulfate  
Cellulose microcrystalline (E460)  
Lactose monohydrate  
Croscarmellose sodium  
Magnesium stearate

#### Coating

Macrogol 3350  
Hypromellose (E464)  
Titanium dioxide (E 171)  
Iron oxide yellow (E 172)

### **6.2 Incompatibilities**

Not applicable

### **6.3 Shelf life**

3 years

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

This medicinal product does not require any special storage conditions.

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

Aluminium / PVC blisters

Cartons of 10, 14, 28, 30, 56, 60, 98, 100, 168 or 196 film-coated tablets.

Not all pack sizes may be marketed.

## **6.6 Special precautions for disposal**

No special requirements for disposal.

## **7. MARKETING AUTHORISATION HOLDER**

Denk Pharma GmbH & Co. KG  
Prinzregentenstrasse 79  
81675 München  
Duitsland

## **8. MARKETING AUTHORISATION NUMBER**

Rivaroxaban Denk 2,5 mg, filmomhulde tabletten, RVG: 120638

## **9. DATE OF FIRST AUTHORISATION**

Datum van eerste verlening van de vergunning: 16 januari 2018  
Datum van laatste verlenging: 16 oktober 2022

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

Laatste gedeeltelijke wijziging betreft rubriek 4.8: 19 oktober 2023