PRODUCT MONOGRAPH

PR FRAGMIN®

Dalteparin Sodium Injection

Solution
10 000 IU (anti-factor Xa)/1 mL, Ampoule
25 000 IU (anti-factor Xa)/mL 3.8 mL, Multi-Dose Vial
2500 IU (anti-factor Xa)/mL 4 mL, Single-Dose Vial

Prefilled syringe with safety needle device
2 500 IU (anti-factor Xa)/0.2 mL
3500 IU (anti-factor Xa)/0.28 mL
5 000 IU (anti-factor Xa)/0.2 mL
7 500 IU (anti-factor Xa)/0.3 mL
10 000 IU (anti-factor Xa)/0.4 mL
12 500 IU (anti-factor Xa)/0.5 mL
15 000 IU (anti-factor Xa)/0.6 mL
18 000 IU (anti-factor Xa)/0.72 mL

Anticoagulant/Antithrombotic Agent

Pfizer Canada Inc
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Kirkland, Quebec H9J 2M5

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PART 1: HEALTH PROFESSIONAL INFORMATION

SUMMARY PRODUCT INFORMATION

<table>
<thead>
<tr>
<th>Route of Administration</th>
<th>Dosage Form / Strength</th>
<th>Clinically Relevant Nonmedicinal Ingredients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parenteral</td>
<td><strong>Solution</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ampoule:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 000 IU (anti-factor Xa)/1 mL;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multi-Dose Vial:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 000 IU (anti-factor Xa)/mL 3.8 mL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single-Dose Vial:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 500 IU (anti-factor Xa)/mL 4 mL</td>
<td></td>
</tr>
<tr>
<td>Prefilled syringe with safety needle device</td>
<td>2 500 IU (anti-factor Xa)/0.2 mL</td>
<td>Benzyl alcohol in Multi-Dose vial only.</td>
</tr>
<tr>
<td></td>
<td>3500 IU (anti-factor Xa)/0.28 mL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 000 IU (anti-factor Xa)/0.2 mL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 500 IU (anti-factor Xa)/0.3 mL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 000 IU (anti-factor Xa)/0.4 mL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 500 IU (anti-factor Xa)/0.5 mL</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>18 000 IU (anti-factor Xa)/0.72 mL</td>
<td></td>
</tr>
</tbody>
</table>

INDICATIONS AND CLINICAL USE

FRAGMIN (Dalteparin Sodium Injection) is indicated for:

- Thromboprophylaxis in conjunction with surgery
- Treatment of acute deep venous thrombosis
- Unstable coronary artery disease (UCAD), i.e., unstable angina and non-Q-wave myocardial infarction
- Prevention of clotting in the extracorporeal system during hemodialysis and hemofiltration in connection with acute renal failure or chronic renal insufficiency
- Extended treatment of symptomatic venous thromboembolism to prevent recurrence of venous thromboembolism in patients with cancer
- Reduction of deep vein thrombosis (DVT) in hospitalized patients with severely restricted mobility during acute illness. Decreased mortality due to thromboembolic events and complications has not been demonstrated
CONTRAINDICATIONS

FRAGMIN should not be used in patients who have the following:

- hypersensitivity to FRAGMIN or any of its constituents, including benzyl alcohol (when using the 25,000 IU multi-dose vial) (see WARNINGS AND PRECAUTIONS, Special Populations, Pregnant Women), or to other low molecular weight heparins and/or heparin or pork products.
- history of confirmed or suspected immunologically-mediated heparin-induced thrombocytopenia (delayed-onset severe thrombocytopenia), and/or in patients in whom an in vitro platelet-aggregation test in the presence of FRAGMIN is positive
- septic endocarditis (endocarditis lenta, acute or subacute endocarditis)
- uncontrollable active bleeding
- major blood clotting disorders
- acute gastroduodenal ulcer
- cerebral hemorrhage
- severe uncontrolled hypertension
- diabetic or hemorrhagic retinopathy
- other conditions or diseases involving an increased risk of hemorrhage
- injuries to and operations on the central nervous system, eyes, and ears
- Spinal/epidural anesthesia is contraindicated where concomitant treatment with repeated high doses of FRAGMIN (100-120 IU/kg given twice daily or 200 IU/kg once daily, such as those needed to treat acute deep-vein thrombosis and unstable coronary artery disease) are required, due to an increased risk of bleeding

WARNINGS AND PRECAUTIONS

<table>
<thead>
<tr>
<th>Special Warnings and Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The multi-dose vial of FRAGMIN (25,000 IU/mL) contains benzyl alcohol (14 mg/mL) as a preservative. Benzyl alcohol has been associated with a potentially fatal “Gasping Syndrome” in neonates. Because benzyl alcohol may cross the placenta, FRAGMIN preserved with benzyl alcohol should not be used in pregnant women (see Special Populations, Pregnant Women).</td>
</tr>
</tbody>
</table>
General

FRAGMIN should NOT be administered intra-muscularly.

FRAGMIN CANNOT BE USED INTERCHANGEABLY (UNIT FOR UNIT) WITH UNFRACTIONATED HEPARIN (UFH) OR OTHER LOW MOLECULAR WEIGHT HEPARINS (LMWHs) AS THEY DIFFER IN THEIR MANUFACTURING PROCESS, MOLECULAR WEIGHT DISTRIBUTION, ANTI-Xa AND ANTI-IIa ACTIVITIES, UNITS AND DOSAGES. SPECIAL ATTENTION AND COMPLIANCE WITH INSTRUCTIONS FOR USE OF EACH SPECIFIC PRODUCT ARE REQUIRED DURING ANY CHANGE IN TREATMENT.

Cardiovascular

Use in Patients with Prosthetic Heart Valves: Cases of prosthetic valve thrombosis have been reported in these patients who have received low molecular weight heparins for thromboprophylaxis. Some of these patients were pregnant women in whom thrombosis led to maternal and/or fetal deaths. Pregnant women are at higher risk of thromboembolism (see WARNINGS AND PRECAUTIONS, Special populations, Pregnant Women).

Use in Unstable Coronary Artery Disease: When thrombolytic treatment is considered appropriate in patients with unstable angina and non-Q-wave myocardial infarction, concomitant use of an anticoagulant such as FRAGMIN may increase the risk of bleeding.

Gastrointestinal

FRAGMIN should be used with caution in patients with a history of gastrointestinal ulceration.

Hematologic

Hemorrhage: Bleeding may occur in conjunction with unfractionated heparin or low molecular weight heparin use. As with other anticoagulants, FRAGMIN should be used with extreme caution in patients at increased risk of hemorrhage. Bleeding can occur at any site during therapy with FRAGMIN. An unexpected drop in hematocrit or blood pressure should lead to a search for a bleeding site (see ADVERSE REACTIONS, Clinical Trial Adverse Drug Reactions, Bleeding, Post-Marketing Adverse Drug Reactions).

Platelets/Thrombocytopenia: Platelet counts should be determined prior to the start of treatment with FRAGMIN and, subsequently, twice weekly for the duration of treatment. Thrombocytopenia of any degree should be monitored closely. Heparin-induced thrombocytopenia can occur with the administration of FRAGMIN. Its incidence is unknown at present.

Caution is recommended when administering FRAGMIN to patients with congenital or drug induced thrombocytopenia or platelet defects.
During FRAGMIN administration, special caution is necessary in rapidly developing thrombocytopenia and severe thrombocytopenia (<100 000/μL). A positive or unknown result obtained from *in vitro* tests for antiplatelet antibody in the presence of FRAGMIN or other low molecular weight heparins and/or heparins would contraindicate FRAGMIN.

**Hepatic**

FRAGMIN should be used with caution in patients with hepatic insufficiency, as these patients may have potentially higher risk of hemorrhage (see ADVERSE REACTIONS, Clinical Trial Adverse Drug Reactions, Liver).

**Hyperkalemia**

Heparin and low molecular weight Heparin can suppress adrenal secretion of aldosterone leading to hyperkalaemia, particularly in patients such as those with diabetes mellitus, chronic renal failure, pre-existing metabolic acidosis, raised plasma potassium or taking potassium sparing drugs. Plasma potassium should be measured in patients at risk.

**Osteoporosis**

Long term treatment with heparin has been associated with a risk of osteoporosis. Although this has not been observed with dalteparin the risk of osteoporosis cannot be excluded (see TOXICOLOGY, Long-term Toxicity, Human Toxicology).

**Peri-Operative Considerations**

**Spinal/Epidural Hematomas:**

When neuraxial anesthesia (epidural/spinal anesthesia) or spinal puncture is employed, patients anticoagulated or scheduled to be anticoagulated with low molecular weight heparins or heparinoids for prevention of thromboembolic complications are at risk of developing an epidural or spinal hematoma which can result in long-term or permanent paralysis.

The risk of these events is increased by the use of indwelling epidural catheters for administration of analgesia or by the concomitant use of drugs affecting hemostasis such as non-steroidal anti-inflammatory drugs (NSAIDs), platelet inhibitors, or other anticoagulants. The risk also appears to be increased by traumatic or repeated epidural or spinal puncture.

Patients should be frequently monitored for signs and symptoms of neurological impairment. If neurological compromise is noted, urgent treatment is necessary.

The physician should consider the potential benefit versus risk before neuraxial intervention in patients anticoagulated or to be anticoagulated for thromboprophylaxis (see CONTRAINDICATIONS and ADVERSE REACTIONS).
When a higher dose (5000 IU s.c.) of FRAGMIN is administered for thromboprophylaxis in conjunction with surgery, no spinal/epidural invasion should be performed for at least 12 hours following the last dose of FRAGMIN and the next dose should be held until at least 12 hours after the anaesthetic procedure. Alternatively, when a lower dose (2500 IU s.c.) of FRAGMIN is administered, the dose can be initiated 1 - 2 hours prior to surgery. FRAGMIN injection should be given after spinal/epidural anaesthesia and only if the anaesthesiologist considers the spinal/epidural puncture as uncomplicated. Indwelling catheters should not be removed or manipulated for at least 10 - 12 hours following the last dose of FRAGMIN.

In patients receiving higher therapeutic dalteparin doses (such as 100IU/kg -120 IU/kg every 12 hours or 200 IU/kg once daily), the interval for the insertion or removal of the epidural or spinal catheter should be a minimum of 24 hours. Extreme vigilance and frequent monitoring must be exercised to detect any signs and symptoms of neurologic impairment such as back pain, sensory or motor deficits (numbness and weakness in lower limbs) and bowel or bladder dysfunction.

Use in Knee Surgery: The risk of bleeding in knee surgery patients receiving low molecular weight heparins may be greater than in other orthopedic surgical procedures. It should be noted that hemarthrosis is a serious complication of knee surgery. The frequency of bleeding events observed with FRAGMIN in orthopedic surgery patients is derived from clinical trials in hip replacement surgery patients. The physician should weigh the potential risks with the potential benefits to the patient in determining whether to administer a low molecular weight heparin in this patient population.

Selection of General Surgery Patients: Risk factors associated with postoperative venous thromboembolism following general surgery include history of venous thromboembolism, varicose veins, obesity, heart failure, malignancy, previous long bone fracture of a lower limb, bed rest for more than 5 days prior to surgery, predicted duration of surgery of more than 30 minutes, and age 60 years or above.

Renal

FRAGMIN should be used with caution in patients with renal insufficiency.

Patients with impaired renal function should be carefully monitored because the half-life for anti-Xa activity after administration of low molecular weight heparin may be prolonged in this patient population (see ACTION AND CLINICAL PHARMACOLOGY, and DOSAGE AND ADMINISTRATION, Use in Patients with Renal Impairment). Dose reduction should be considered in patients with severe renal impairment.

Meanwhile, emerging data from publications based on one study suggests that in critically ill patients with severe renal insufficiency, thromboprophylaxis with Fragmin at 5,000 IU once daily, does not appear to be associated with an excessive anticoagulant effect due to drug bioaccumulation and is unlikely to contribute to bleeding8, 13 (see ACTION AND CLINICAL PHARMACOLOGY – special populations and conditions, Renal Insufficiency).
**Special Populations**

**Pregnant Women:**

The multi-dose vial of FRAGMIN (25,000 IU/mL) contains benzyl alcohol (14 mg/mL) as a preservative. Benzyl alcohol has been associated with a potentially fatal “Gasping Syndrome” in neonates. Cases of Gasping Syndrome have been reported in neonates when benzyl alcohol has been administered in amounts of 99-404 mg/kg/day. Manifestations of the disease include: metabolic acidosis, respiratory distress, gasping respirations, central nervous system dysfunction, convulsions, intracranial hemorrhages, hypoactivity, hypotonia, cardiovascular collapse and death. Benzyl alcohol containing formulations must not be used in premature or newborn babies. Benzyl alcohol may cause toxic reactions and anaphylactoid reactions in infants and children up to 3 years old. Other formulations without benzyl alcohol are available.

Because benzyl alcohol may cross the placenta, FRAGMIN preserved with benzyl alcohol should not be used in pregnant women.

There are also postmarketing reports of prosthetic valve thrombosis in pregnant women with prosthetic heart valves while receiving low molecular weight heparins for thromboprophylaxis. These events led to maternal death or surgical interventions.

Pregnant women with prosthetic heart valves appear to be at exceedingly high risk of thromboembolism. An incidence of thromboembolism approaching 30% has been reported in these patients, in some cases even with apparent adequate anticoagulation at treatment doses of low molecular weight heparins or unfractionated heparin. Any attempt to anticoagulate such patients should normally only be undertaken by medical practitioners with documented expertise and experience in this clinical area.

Data from [one single publication](#) suggests that ante partum thromboprophylaxis is warranted in pregnant women with idiopathic thrombosis or symptomatic thrombophilia (see ACTION AND CLINICAL PHARMACOLOGY – special populations and conditions, Pregnant Women).

Teratogenic Effects: As with other low molecular weight heparins (LMWH), FRAGMIN should not be used in pregnant women unless the therapeutic benefits to the patients outweigh the possible risks. There have been reports of congenital anomalies in infants born to women who received LMWHs during pregnancy, including cerebral anomalies, limb anomalies, hypospadias, peripheral vascular malformation, fibrotic dysplasia and cardiac defects. A causal relationship has not been established nor has the incidence been shown to be higher than in the general population.

Non-teratogenic Effects: There have been postmarketing reports of fetal death when pregnant women received low molecular weight heparins. Causality for these cases has not been established. Pregnant women receiving anticoagulants, including FRAGMIN, are at increased risk for bleeding. Hemorrhage can occur at any site and may lead to death of mother and/or fetus. Pregnant women receiving FRAGMIN should be carefully monitored. Pregnant women and women of child-bearing potential should be informed of the potential hazard to the fetus and the mother if FRAGMIN is administered during pregnancy.
Nursing Women:

It is not known whether FRAGMIN is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when FRAGMIN is administered to nursing women.

Fertility:

Four animal studies were conducted with Heparin fragment Kabi 2165 (dalteparin sodium) in rats and rabbits. No effects on fertility, copulation or peri- and postnatal development were noted in these studies.

Pediatrics:

The safety and effectiveness of FRAGMIN in children have not been established. There is currently available data but no recommendation on a posology can be made (see ACTION AND CLINICAL PHARMACOLOGY, Pediatric population).

Geriatrics:

Elderly patients receiving low molecular weight heparins are at increased risk of bleeding. Careful attention to dosing intervals and concomitant medications, especially anti-platelet preparations, is advised. Close monitoring of elderly patients with low body weight (e.g., <45 kg) and those predisposed to decreased renal function is recommended.

Patients with Extreme Body Weight:

Safety and efficacy of low molecular weight heparins in high weight (e.g., >120 kg) and low weight (e.g., <46 kg) patients have not been fully determined. Individualized clinical and laboratory monitoring are recommended in these patients.

However, data from one single publication suggests that in the thrombosis treatment setting, a weight-adjusted dose beyond the recommended maximum dose of 18000 International Units/day (the largest patient weighed 190 Kg and received a daily dose of 38000 IU) results in mean peak anti-Xa levels that are within the therapeutically acceptable range (see ACTION AND CLINICAL PHARMACOLOGY – special populations and conditions, Overweight Population)

Monitoring and Laboratory Tests

Monitoring FRAGMIN Activity: Determination of anti-factor Xa levels in plasma is the only method available for monitoring FRAGMIN activity. Routine clotting assays are unsuitable for monitoring its anticoagulant activity. Only at very high plasma FRAGMIN levels is activated partial thromboplastin time (APTT) prolongation observed. Prolongation of APTT during
hemodialysis and treatment of acute deep venous thrombosis should only be used as a criterion of overdose. Dose increases aimed at prolonging APTT could cause overdosing and bleeding.

Measurement of peak anti-Xa levels at about 4 hours post-dose should be considered in patients at higher risk of bleeding and receiving FRAGMIN, such as the elderly, patients with renal impairment or the extremes of body weight, during pregnancy, or for children. At treatment doses of 100 IU/kg s.c. twice daily, peak anti-Xa levels should generally be maintained at no more than 1.0 IU/mL in these patients.

When FRAGMIN is administered subcutaneously, the individual patient’s anti-Xa activity level will not remain within the range that would be expected with unfractionated heparin by continuous i.v. infusion throughout the entire dosing interval. FRAGMIN should be administered as directed (see DOSAGE AND ADMINISTRATION).

<table>
<thead>
<tr>
<th>Dosage</th>
<th>Anti-Xa levels (IU/mL) at peak 3 - 4 hours post s.c. injections* Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2500 IU</td>
<td>0.20 ± 0.08</td>
</tr>
<tr>
<td>5000 IU</td>
<td>0.49 ± 0.13</td>
</tr>
<tr>
<td>100 IU/kg</td>
<td>0.61 ± 0.17</td>
</tr>
<tr>
<td>120 IU/kg</td>
<td>0.91 ± 0.32</td>
</tr>
<tr>
<td>200 IU/kg</td>
<td>1.2 ± 0.43</td>
</tr>
</tbody>
</table>

* For 2500 IU and 5000 IU (given as single doses), peak levels were obtained from populations of healthy volunteers; for multiple doses of 100 IU/kg twice daily, 120 IU/kg twice daily and 200 IU/kg once daily, peak levels were obtained from patient populations treated for acute DVT.

At higher doses, increases in APTT may occur. With normal prophylactic doses, FRAGMIN does not modify global clotting tests of APTT, prothrombin time (PT) and thrombin clotting time (TT). Therefore, treatment cannot be monitored with these tests.

Liver Function Tests: Since FRAGMIN use may be associated with a rise in hepatic transaminases, this observation should be considered when liver function tests are assessed (see ADVERSE REACTIONS, Clinical Trial Adverse Drug Reactions, Liver).

As with all antithrombotic agents, there is a risk of systemic bleeding with dalteparin sodium administration. Care should be taken with dalteparin sodium use in newly operated patients. After treatment is initiated patients should be carefully monitored for bleeding complications. This may be done by regular physical examination of the patients, close observation of the surgical drain and periodic measurements of hemoglobin, and anti-Xa determinations.
ADVERSE REACTIONS

Adverse Drug Reaction Overview

Clinically significant adverse reactions observed with use of FRAGMIN and other low molecular weight heparins include bleeding events and local reactions, with a low incidence of thrombocytopenia and allergic reactions.

Clinical Trial Adverse Drug Reactions

Bleeding

As with any antithrombotic treatment, hemorrhagic manifestations can occur. Injection site hematomas are a common side effect with FRAGMIN (dalteparin sodium), occurring at a frequency of less than 5% with lower (prophylaxis) doses and less than 10% with higher (treatment) doses.

The incidence of major hemorrhagic complications during FRAGMIN treatment has been low and generally did not differ from that observed with unfractionated heparin. Patients taking FRAGMIN are at risk for major bleeding complications when plasma anti-Xa levels approach 2.0 IU/mL. Other risk factors associated with bleeding on therapy with heparins include serious concurrent illness, chronic heavy consumption of alcohol, use of platelet inhibiting drugs, renal failure, age and, possibly, female gender. Petechiae or easy bruising may precede frank hemorrhage. Bleeding may range from minor local hematomas to major hemorrhage. The early signs of bleeding may include epistaxis, hematuria, or melena. Bleeding may occur at any site and be difficult to detect, for example, retroperitoneal bleeding. Bleeding may also occur at surgical sites. Major hemorrhage, including retroperitoneal or intracranial bleeding, has been reported in association with FRAGMIN use, in some cases leading to fatality. Spinal or epidural hematomas have been reported with the concurrent use of FRAGMIN and spinal/epidural anaesthesia.

Thromboprophylaxis in Conjunction with Surgery

The following table summarizes major bleeding events that occurred in pivotal trials of FRAGMIN for thromboprophylaxis in general surgery associated with thromboembolic complications.
### Bleeding Events for Thromboprophylaxis in General Surgery Associated with Thromboembolic Complications

<table>
<thead>
<tr>
<th></th>
<th>FRAGMIN$^1$</th>
<th>Heparin$^2$</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=385 n (%)</td>
<td>N=265 n (%)</td>
<td>N=108 n (%)</td>
</tr>
<tr>
<td>Major bleeding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wound or Perioperative Bleed</td>
<td>11 (2.9)</td>
<td>3 (1.1)</td>
<td>4 (3.7)</td>
</tr>
<tr>
<td>Wound hematoma</td>
<td>10 (2.6)</td>
<td>2 (0.8)</td>
<td>4 (3.7)</td>
</tr>
<tr>
<td></td>
<td>1 (0.3)</td>
<td>1 (0.4)</td>
<td>0 (0.0)</td>
</tr>
</tbody>
</table>

Treatment for at least 5-7 days

1. 2500 IU s.c. 2 hours before surgery, then 2500 IU daily
2. Heparin 5000 IU s.c. 2 hours before surgery, then 12 hours later and once daily thereafter

The following table summarizes major bleeding events that occurred in pivotal trials of FRAGMIN for thromboprophylaxis in general surgery associated with other risk factors (e.g., malignancy) and trials of elective hip surgery.

### Bleeding Events for Thromboprophylaxis in General Surgery Associated with Other Risk Factors and Elective Hip Surgery

<table>
<thead>
<tr>
<th></th>
<th>FRAGMIN vs Warfarin sodium$^5$</th>
<th>FRAGMIN vs Heparin$^4$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FRAGMIN$^3$ vs Warfarin sodium$^5$</td>
<td>FRAGMIN$^4$ vs Heparin$^4$</td>
</tr>
<tr>
<td></td>
<td>N=543 n (%)</td>
<td>N=533 n (%)</td>
</tr>
<tr>
<td>Major bleeding</td>
<td>11 (2.0)</td>
<td>10 (1.9)</td>
</tr>
</tbody>
</table>

*Treatment for at least 5-10 days
** Treatment for 6 ± 2 days
1. 5000 IU s.c. once daily after surgery with the initial dose given 8 hours before surgery; or 2500 IU 2 hours before surgery and 2500 IU 12 hours later, then 5000 IU once daily
2. Heparin 5000 IU s.c. 2 hours before surgery, 5000 IU s.c. evening of surgery, then 5000 IU s.c. twice daily; or 5000 IU s.c. three times daily
3. 2500 IU s.c. 2 hours before surgery, 2500 IU s.c. at least 4 hours after surgery, then 5000 IU s.c. once daily
4. 2500 IU s.c. at least 4 hours after surgery, then 5000 IU s.c. once daily
5. Warfarin sodium 10 mg evening of day of surgery, then dose adjustment to maintain an INR from 2.0 to 3.0

In a third hip replacement surgery clinical trial in which patients were randomized to FRAGMIN 2500 IU administered 2 hours before surgery, followed by 2500 IU at least 6 hours later and maintained on 5000 IU daily or warfarin 5-7.5 mg beginning the night before surgery, the incidence of major bleeding events was 2.6% (7/274) for patients treated with FRAGMIN and 0.4% (1/279) for patients treated with warfarin.

**Treatment of Acute Deep Vein Thrombosis**

In 3 pivotal studies of patients with deep vein thrombosis treated with FRAGMIN 100-120 IU/kg s.c. twice daily or 120-240 IU/kg continuous infusion over 12 hours vs. heparin 240 U/kg continuous infusion over 12 hours, 2/103 (1.9%) and 1/119 (0.8%) of patients treated with

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FRAGMIN and heparin, respectively, experienced major bleeding. The corresponding percentages from pivotal studies of patients treated with FRAGMIN 200 IU/kg given s.c. once daily vs. heparin given in a dose of 20,000-40,000 U/24 hour i.v. infusion were 4/328 (1.2%) and 5/353 (1.4%), respectively.

Unstable Angina and Non-Q-Wave Myocardial Infarction

The following table summarizes major bleeding events that occurred with FRAGMIN, heparin, and placebo in clinical trials of unstable angina and non-Q-wave myocardial infarction.

| Major Bleeding Events in Unstable Angina and Non-Q-Wave Myocardial Infarction |
|--------------------------------|----------------|----------------|
| FRAGMIN | Heparin | Placebo |
| 120 IU/kg/12 hr. s.c.\(^1\) | i.v. and s.c.\(^2\) | q 12 hr. s.c. |
| N=1497 | N=731 | N=760 |
| n (%) | n (%) | n (%) |
| 15 (1.0%) | 7 (1.0%) | 4 (0.5%) |

\(^1\) Treatment was administered for 5 to 8 days
\(^2\) Heparin i.v. infusion for at least 48 hours, APPT 1.5 to 2 times control, then 12,500 U s.c. every 12 hours for 5 to 8 days
\(^3\) Aspirin (75 to 165 mg per day) and beta blocker therapies were administered concurrently
\(^4\) Bleeding events were considered major if: 1) accompanied by a decrease in hemoglobin of ≥2 g/dL in connection with clinical symptoms; 2) a transfusion was required; 3) bleeding led to interruption of treatment or death; or 4) intracranial bleeding

Extended Treatment of Symptomatic Venous Thromboembolism (VTE) to Prevent Recurrence of VTE in Patients with Cancer

The following table summarizes major bleeding events that occurred in the pivotal trial of FRAGMIN in patients with cancer treated for symptomatic VTE to prevent recurrence of VTE.

| Bleeding Events for Extended Treatment of Symptomatic VTE to Prevent Recurrence of VTE in Patients with Cancer |
|------------------------------------------------|----------------|----------------|
| FRAGMIN\(^1\) | Oral Anticoagulant\(^2\) | p-value* |
| N=338 | N=335 | |
| n (%) | n (%) | |
| 19 (5.6) | 12 (3.6) | 0.270 |

\(^1\) FRAGMIN 200 IU/kg s.c. administered once daily for the first month, then approximately 150 IU/kg s.c. for months 2-6
\(^2\) FRAGMIN 200 IU/kg s.c. for ≥5 days plus oral anticoagulant for 6 months dose adjusted to an INR of 2.0-3.0
*Fisher’s Exact Test

Deep Vein Thrombosis in Hospitalized Patients with Severely Restricted Mobility

The following table summarizes the adverse events from the clinical trial of hospitalized patients with severely restricted mobility during acute illness.
Adverse Events in Hospitalized Patients with Restricted Mobility

<table>
<thead>
<tr>
<th></th>
<th>Dalteparin, N=1848 n (%)</th>
<th>Placebo, N=1833 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 14</td>
<td>8 (0.43)</td>
<td>7 (0.38)</td>
</tr>
<tr>
<td>Day 21</td>
<td>43 (2.35)</td>
<td>42 (2.32)</td>
</tr>
<tr>
<td>Day 90</td>
<td>107 (6.12)</td>
<td>103 (6.01)</td>
</tr>
<tr>
<td>Hemorrhage(^1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatal, day 21</td>
<td>2 (0.11)</td>
<td>1 (0.05)</td>
</tr>
<tr>
<td>Major, day 14</td>
<td>8 (0.43)</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>Major, day 21</td>
<td>9 (0.49)</td>
<td>3 (0.16)</td>
</tr>
<tr>
<td>Minor, day 14</td>
<td>16 (0.87)</td>
<td>5 (0.27)</td>
</tr>
<tr>
<td>Minor, day 21</td>
<td>19 (1.03)</td>
<td>10 (0.55)</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 14</td>
<td>10 (0.54)</td>
<td>6 (0.33)</td>
</tr>
<tr>
<td>Day 21</td>
<td>10 (0.54)</td>
<td>8 (0.44)</td>
</tr>
</tbody>
</table>

\(^1\) A bleeding event was considered major if: 1) was accompanied by a decrease in hemoglobin of \( \geq 2 \) g/dL in connection with clinical symptoms; 2) intraocular, spinal/epidural, intracranial, or retroperitoneal bleeding; 3) required transfusion of \( \geq 2 \) units of blood products; 4) required significant medical or surgical intervention; or 5) led to death.

Three of the major bleeding events that occurred by Day 21 were fatal, all due to gastrointestinal hemorrhage (2 patients in the group treated with FRAGMIN and 1 in the group receiving placebo). Two deaths occurred after Day 21: 1 patient in the placebo group died from a subarachnoid hemorrhage that started on Day 55, and 1 patient died on day 71 (2 months after receiving the last dose of FRAGMIN) from a subdural hematoma.

<table>
<thead>
<tr>
<th>MedDRA System Organ Class</th>
<th>Adverse Drug Reactions</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood and lymphatic system disorders</td>
<td>Mild, reversible non-immunological thrombocytopenia</td>
<td>common</td>
</tr>
<tr>
<td></td>
<td>angioedema</td>
<td>rare</td>
</tr>
<tr>
<td>Hepato-biliary disorders</td>
<td>Transient elevation of liver transaminases (ASAT, ALAT)*</td>
<td>common</td>
</tr>
<tr>
<td>Immune system disorders</td>
<td>anaphylactoid reactions**</td>
<td>rare</td>
</tr>
<tr>
<td>Skin and subcutaneous tissue disorders</td>
<td>Skin rash, allergic reactions and skin necrosis</td>
<td>rare</td>
</tr>
<tr>
<td>General disorders and administration site conditions</td>
<td>Pain at injection site</td>
<td>Common</td>
</tr>
<tr>
<td>Injury, poisoning and procedural complications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*has not been correlated to any long-term effect on liver function
** FRAGMIN therapy should be discontinued in patients showing local or systemic allergic responses.

Skeletal Effects
Use of low molecular weight heparins over extended periods has been reported to be associated with development of osteopenia.
Post-Marketing Adverse Reactions

In post-marketing experience, the following undesirable effects have been reported:

<table>
<thead>
<tr>
<th>MedDRA System Organ Class</th>
<th>Adverse Drug Reactions</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood and lymphatic system disorders</td>
<td>Severe immunologically-mediated heparin-induced thrombocytopenia (type II, with or without associated thrombotic complications), see WARNINGS AND PRECAUTIONS, Hematologic, Platelets/Thrombocytopenia, thrombocytopenia, thrombocythemia</td>
<td>rare</td>
</tr>
<tr>
<td>Immune system disorders</td>
<td>anaphylactic reactions</td>
<td>rare</td>
</tr>
<tr>
<td>Skin and subcutaneous tissue disorders</td>
<td>skin necrosis, alopecia</td>
<td>very rare, common</td>
</tr>
<tr>
<td>General disorders and administration site conditions</td>
<td>retroperitoneal hemorrhage*, gastrointestinal hemorrhage*, intracranial hemorrhage*, hemorrhage (bleeding at any site)</td>
<td>very rare, unknown, unknown</td>
</tr>
<tr>
<td>Injury, poisoning and procedural complications</td>
<td>spinal or epidural hematoma</td>
<td>unknown</td>
</tr>
</tbody>
</table>

* occasionally leading to fatality

Pediatric population: The most common adverse events reported in patients who were <18 years of age were thrombocytopenia, haemorrhage, error in drug administration, thrombosis, and alopecia. The safety of long term dalteparin administration has not been established.

DRUG INTERACTIONS

Drug-Drug Interactions

FRAGMIN should be used with caution in patients receiving oral anticoagulants, platelet inhibitors, non-steroidal anti-inflammatory drugs, thrombolytic agents and dextran because of increased risk of bleeding. Acetylsalicylic acid (ASA), unless contraindicated, is recommended in patients treated for unstable angina or non-Q-wave myocardial infarctions (see DOSAGE AND ADMINISTRATION, ADVERSE REACTIONS).

Because NSAIDs and ASA analgesic/anti-inflammatory doses reduce production of vasodilatatory prostaglandins, and thereby renal blood flow and the renal excretion, particular care should be taken when administering dalteparin concomitantly with NSAIDs or high dose ASA in patients with renal failure.
Drug-Food Interactions

Interactions with food have not been established.

Drug-Herb Interactions

Interactions with herbs have not been established.

Drug-Lab tests Interactions

Interactions with lab tests have not been established.

Drug-Lifestyle Interactions

Interactions with lifestyle have not been established.

DOSAGE AND ADMINISTRATION

FRAGMIN may be given by subcutaneous (s.c.) injection or by intermittent or continuous intravenous (i.v.) infusion, depending upon the circumstances. **FRAGMIN must NOT be administered intramuscularly** (see WARNINGS AND PRECAUTIONS). Clinical trials conducted in support of clinical uses outlined below generally used subcutaneous dosing.

Dosing

*Thromboprophylaxis in Conjunction with Surgery*

The dose of FRAGMIN required for adequate prophylaxis without substantially increasing bleeding risk varies depending on patient risk factors.

**General surgery with associated risk of thromboembolic complications:** 2500 IU s.c. administered 1-2 hours before the operation, and thereafter 2500 IU s.c. each morning until the patient is mobilized, in general 5-7 days or longer.

**General surgery associated with other risk factors** (see WARNINGS AND PRECAUTIONS, Peri-Operative Considerations, Selection of General Surgery Patients): 5000 IU s.c. is given the evening before the operation and then 5000 IU s.c. the following evenings. Treatment is continued until the patient is mobilized, in general for 5-7 days or longer.

As an alternative, 2500 IU s.c. is given 1-2 hours before the operation, with 2500 IU s.c. given again no sooner than 4 hours after surgery, but at least 8 hours after the previous dose, provided primary hemostasis is obtained. Starting on the day after surgery, 5000 IU s.c. is given each morning, in general for 5-7 days or longer.
**Elective hip surgery**: 5000 IU s.c. is given the evening before the operation and then 5000 IU s.c. the following evenings. Treatment is continued until the patient is mobilized, in general for 5-7 days or longer.

As an alternative 2500 IU s.c. is given 1-2 hours before the operation and 2500 IU s.c. 4-8 hours after surgery, provided primary hemostasis is obtained. Starting on the day after surgery, 5000 IU s.c. is given each morning, in general for 5-7 days or longer.

The pre-operative dose may be omitted and an initial dose of 2500 IU s.c. administered 4-8 hours after the operation, provided primary hemostasis is obtained. Starting on the day after surgery, 5000 IU s.c. is given each morning, in general for 5-7 days or longer. Omission of the pre-operative dose may reduce risk of peri-operative bleeding, however increased risk of venous thromboembolic events is possible. This option is based on the results of the North American Fragmin Trial (NAFT), which excluded patients at high risk of bleeding, i.e., documented cerebral or gastrointestinal bleeding within 3 months prior to surgery, defective hemostasis, e.g., thrombocytopenia (<100 x 10^9/L), ongoing anticoagulant treatment.

**Treatment of Acute Deep Vein Thrombosis**

The following dosage is recommended: 200 IU/kg body weight given s.c. once daily. The expected plasma anti-Xa levels during subcutaneous treatment would be <0.3 IU anti-Xa/mL before injection and <1.7 IU anti-Xa/mL 3 - 4 hours after injection. In order to individualize the dose, a functional anti-Xa assay should be performed 3 - 4 hours post-injection. The single daily dose should not exceed 18 000 IU. The following weight intervals are recommended to be adapted to the single-dose prefilled syringes as in the table below.

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Dosage (IU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>46-56</td>
<td>10 000</td>
</tr>
<tr>
<td>57-68</td>
<td>12 500</td>
</tr>
<tr>
<td>69-82</td>
<td>15 000</td>
</tr>
<tr>
<td>83 and above*</td>
<td>18 000</td>
</tr>
</tbody>
</table>

For patients with increased risk of bleeding, a dose of 100 IU/kg body weight given s.c. twice daily or 100 IU/kg body weight administered over a period of 12 hours as continuous i.v. infusion, can be used. The expected plasma anti-Xa levels during subcutaneous treatment would be >0.1 IU anti-Xa/mL before injection and <1.0 IU anti-Xa/mL 3 - 4 hours after injection.

Normally concomitant treatment with vitamin-K antagonists is started immediately. Treatment with FRAGMIN should be continued until the levels of the prothrombin complex factors (FII, FVII, FIX, FX) have decreased to a therapeutic level, in general for approximately 5 days.

*For patient weighing (kg) 83 and above, data from one single publication suggests that in the thrombosis treatment setting, a weight-adjusted dose beyond the recommended maximum dose of 18000 International Units/day (the largest patient weighed 190 Kg and received a daily dose of 38000 IU) results in mean peak anti-Xa levels that are within the therapeutically acceptable range24 (see ACTION AND CLINICAL PHARMACOLOGY – special populations and conditions, Overweight Population)
Extended Treatment of Symptomatic Venous Thromboembolism (VTE) to Prevent Recurrence of VTE in Patients with Cancer

Month 1: 200 IU/kg body weight given s.c. once daily for the first 30 days of treatment. The total daily dose should not exceed 18,000 IU daily.

Months 2-6: Approximately 150 IU/kg given s.c. once daily using the table shown below.

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Dosage (IU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤56</td>
<td>7500</td>
</tr>
<tr>
<td>57-68</td>
<td>10000</td>
</tr>
<tr>
<td>69-82</td>
<td>12500</td>
</tr>
<tr>
<td>83-98</td>
<td>15000</td>
</tr>
<tr>
<td>≥99</td>
<td>18000</td>
</tr>
</tbody>
</table>

Dose reductions for chemotherapy-induced thrombocytopenia: In the case of chemotherapy-induced thrombocytopenia with platelet counts <50,000/mm³, FRAGMIN should be interrupted until the platelet count recovers above 50,000/mm³. For platelet counts between 50,000 and 100,000/mm³, FRAGMIN should be reduced by 17% to 33% of the initial dose (allowing for dosage adjustment using the prefilled syringes), depending on the patient's weight (table below). Once the platelet count recovers to ≥ 100,000/mm³, FRAGMIN should be re-instituted at full dose.

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Scheduled Dose (IU)</th>
<th>Reduced Dose (IU)</th>
<th>Mean Dose Reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤56</td>
<td>7500</td>
<td>5000</td>
<td>33</td>
</tr>
<tr>
<td>57-68</td>
<td>10000</td>
<td>7500</td>
<td>25</td>
</tr>
<tr>
<td>69-82</td>
<td>12500</td>
<td>10000</td>
<td>20</td>
</tr>
<tr>
<td>83-98</td>
<td>15000</td>
<td>12500</td>
<td>17</td>
</tr>
<tr>
<td>≥99</td>
<td>18000</td>
<td>15000</td>
<td>17</td>
</tr>
</tbody>
</table>

Unstable Coronary Artery Disease (Unstable Angina and Non-Q-Wave Myocardial Infarction)

120 IU/kg body weight given s.c. twice daily with a maximum dose of 10 000 IU/12 hours. The expected plasma anti-Xa levels during subcutaneous treatment would be >0.1 IU anti-Xa/mL before injection and <1.6 IU anti-Xa/mL 3 - 4 hours after injection. These levels were obtained from another patient population. Treatment should be continued for up to 6 days. Concomitant therapy with ASA is recommended.
Deep Vein Thrombosis in Hospitalized Patients with Severely Restricted Mobility

In hospitalized patients with severely restricted mobility during acute illness, the recommended dose of FRAGMIN is 5000 IU administered by s.c. injection once daily. In clinical trials, the usual duration of administration was 12 to 14 days.

Use in Patients with Renal Impairment

All patients with renal impairment treated with low molecular weight heparins should be monitored carefully.

Administration of low molecular weight heparins to patients with renal impairment has been shown to result in prolongation of anti-Xa activity, especially in those with severe renal impairment (creatinine clearance <30 mL/min), which may lead to an increased risk of bleeding. This effect has not yet been determined for FRAGMIN. Consideration of dosage adjustment in patients with severe renal impairment should be undertaken (see ACTION AND CLINICAL PHARMACOLOGY). However, emerging data from the literature suggests that in critically ill patients with severe renal insufficiency, thromboprophylaxis with Fragmin at 5,000 IU once daily, does not appear to be associated with an excessive anticoagulant effect due to drug bioaccumulation and is unlikely to contribute to bleeding8, 13 (see ACTION AND CLINICAL PHARMACOLOGY – special populations and conditions, Renal Insufficiency).

Anticoagulation for Hemodialysis and Hemofiltration

Chronic renal failure, patients with no other known bleeding risk: Hemodialysis and hemofiltration for a maximum of 4 hours: dose as below, or only i.v. bolus injection of 5000 IU. Hemodialysis and hemofiltration for more than 4 hours: i.v. bolus injection of 30 - 40 IU/kg body weight followed by i.v infusion of 10 - 15 IU/kg body weight per hour. This dose normally produces plasma levels lying within the range of 0.5 - 1.0 IU anti-Xa/mL.

Acute renal failure, patients with high bleeding risk: i.v. bolus injection of 5 - 10 IU/kg body weight, followed by i.v. infusion of 4 - 5 IU/kg body weight per hour. Plasma level should lie within the range of 0.2 - 0.4 IU anti-Xa/mL.

Dilution

FRAGMIN solution for injection may be mixed with isotonic sodium chloride or isotonic glucose infusion solutions in glass infusion bottles and plastic containers. Post-dilution concentration: 20 IU/mL.
As with all parenteral drug products, intravenous admixtures should be inspected visually for clarity, particulate matter, precipitation, discoloration and leakage prior to administration, whenever solution and container permit.

1 mL 10 000 IU

Isotonic NaCl Infusion
(9 mg/mL) 500 mL
or
Isotonic Glucose Infusion
(50 mg/mL) 500 mL

The infusion rate is 10 mL/hour. The solution should be used within 24 hours.

OVERDOSAGE

Accidental overdosage following administration of FRAGMIN may lead to hemorrhagic complications. FRAGMIN should be immediately discontinued, at least temporarily, in cases of significant excess dosage. In more serious cases, protamine should be administered.

The anticoagulant effect of FRAGMIN is inhibited by protamine. This effect may be largely neutralized by slow intravenous injection of protamine sulphate. The dose of protamine to be given should be 1 mg protamine per 100 anti-Xa IU of FRAGMIN administered. A second infusion of 0.5 mg protamine per 100 anti-Xa IU of FRAGMIN may be administered if the APTT measured 2 to 4 hours after the first infusion remains prolonged. However, even with higher doses of protamine, the APTT may remain prolonged to a greater extent than usually seen with unfractionated heparin. Anti-Xa activity is never completely neutralized (maximum about 60%).

Particular care should be taken to avoid overdosage with protamine sulphate. Administration of protamine sulphate can cause severe hypotensive and anaphylactoid reactions. Because fatal reactions, often resembling anaphylaxis, have been reported with protamine sulphate, it should be given only when resuscitation equipment and treatment of anaphylactic shock are readily available. Refer to the protamine sulphate Product Monograph for further directions for use.

For management of a suspected drug overdose, contact your regional Poison Control Centre.
ACTION AND CLINICAL PHARMACOLOGY

Mechanism of Action

FRAGMIN is a low molecular weight heparin with antithrombotic properties.

Dalteparin sodium is produced through controlled nitrous acid depolymerization of sodium heparin from porcine intestinal mucosa. It is composed of strongly acidic sulphated polysaccharide chains with a weight average molecular weight of 6000 Daltons and about 90% of the material within the range 2000-9000. Dalteparin sodium is composed of molecules with and without a specially characterized pentasaccharide, the antithrombin binding site that is essential for high affinity binding to the plasma protein antithrombin (AT III).

Pharmacodynamics

FRAGMIN acts by potentiating the activity of antithrombin III, inhibiting formation of both Factor Xa and thrombin. However, it preferentially potentiates inhibition of Factor Xa, resulting in only slight increases of clotting time, i.e., activated partial thromboplastin time (APTT).

Effects of unfractionated heparin are monitored by assessing APTT and anti-factor Xa (anti-Xa) activity. For FRAGMIN, however, only high doses lead to noticeable increases in the APTT; therefore, measurement of APTT can be used only as an indicator of overdosage. In the case of FRAGMIN, anti-Xa activity of plasma is used both as an estimate of clotting activity, and as a basis to determine dosage. FRAGMIN potency is described in international anti-Xa units (IU).

The specific activity of FRAGMIN on factor Xa (by measurement of anti-factor Xa IU/mg) is 130, and its specific activity on factor IIa (by measurement of anti-factor IIa IU/mg) is 58. The ratio of anti-Xa/anti-IIa activity for FRAGMIN is 2.2 (for unfractionated heparin the anti-Xa/anti-IIa is equal to 1).

Dalteparin sodium has a smaller effect on platelet function and platelet adhesion than heparin, and thus has only a small effect on primary hemostasis. Heparin treatment depletes the pool of platelet factor 4, while dalteparin sodium has much less of an effect.

Pharmacokinetics

Absorption: The half-life of FRAGMIN has been shown to be 2 hours after intravenous injection and 3-4 hours after subcutaneous injection. The bioavailability after subcutaneous injection is approximately 90% and the pharmacokinetics are not dose-dependent. The plasma concentration of FRAGMIN following subcutaneous administration correlates directly with the administered dose and anti-Xa activity in plasma, as measured by the area under the activity curve. For the twice daily dosing regimen (100 IU/kg/12 hours) of FRAGMIN, the steady state level is attained after 2-4 s.c. injections (24-48 hours).

Distribution: The volume of distribution was found to be approximately 3 litres.
Animal studies using radioactively labelled drug have shown that the distribution of FRAGMIN is similar, whether the dose is administered intravenously or subcutaneously (i.v. or s.c.).

**Excretion:** After 4 hours about 20% is seen in the urine, with most of the remainder found in the liver, GI tract and kidney. After 72 hours, 70% of a radioactive FRAGMIN dose has been excreted. Less FRAGMIN is found in the liver than standard heparin; the kidneys are the major site of FRAGMIN excretion (approximately 70% based on animal studies). Dalteparin sodium, in contrast to heparin, is not cleared by a saturable mechanism; low doses are expressed in plasma and increasing the dose does not modify its clearance.

**Special Populations and Conditions**

**Renal Insufficiency:** In a study of 8 patients with chronic renal failure undergoing hemodialysis administered FRAGMIN 5000 IU intravenously, a half-life of about 5.7 hours was observed, compared to that of about 2 hours as previously reported in healthy volunteers receiving FRAGMIN intravenously (see WARNINGS AND PRECAUTIONS, Renal, and DOSAGE AND ADMINISTRATION, Use in Patients with Renal Impairment).

In a multicenter, open-label, prospective cohort study (DIRECT study) of critically ill patients with severe acute or chronic renal insufficiency or dialysis (mean creatinine clearance of 18.9 ml/min), 138 evaluable patients received at least one dose of subcutaneous dalteparin 5,000 IU once daily as thromboprophylaxis. The median duration of dalteparin administration was 7 days. Trough anti-Xa levels were measured twice weekly, 20 hours after the prior dalteparin dose, to assess for dalteparin bioaccumulation (defined as anti-Xa levels > 0.40 IU/mL). No patient (0%; 95% CI: 0, 3.0) had bioaccumulation, during the study. The median (inter-quartile range [IQR]) trough anti-Xa level was <0.10 IU/mL (<0.10, <0.10). Serial anti-Xa levels were measured at approximately 3, 10, and 17 days after the start of dalteparin; Peak levels were between 0.29 IU/mL and 0.34 IU/mL and trough levels were below the lower limit of detection (<0.06 IU/mL) irrespective of the duration of treatment. These peak anti-Xa levels achieved with prophylactic dose dalteparin were consistent with peak prophylactic levels of anticoagulation of 0.20–0.40 IU/ml observed in other hospitalized medical and surgical patients.8, 13

**Pregnant Women:** In a prospective trial, the EThIG study, 810 pregnant women were assigned to one of three management strategies according to pre-defined risk factors related to history of VTE and thrombophilic profile. Low-risk women (group I), received 50–100 IU dalteparin/ kg body weight/ day for 14 days postpartum, or earlier when additional risk factors occurred. Women at high (group II) or very high risk (group III) received dalteparin from enrolment until six weeks postpartum (50–100 IU and 100–200 IU/ kg/ day, respectively). Risk-stratified heparin prophylaxis was associated with a low incidence of symptomatic VTE and few clinically important adverse events. Symptomatic VTE occurred in five women (0.6 %; 95% CI 0.2, 1.5%). There were no events in group I; three women in group II suffered an event (2 antepartum, 1 postpartum) and two in group III (both postpartum). Bleeding was classified as serious in 24 episodes (3.0% 95% CI: 1.9, 4.4 %) in 22 women (2.7% 95% CI: 1.8, 4.2 %), and no cases of fatal bleeding occurred. Thrombocytopenia occurred in 18 women (2.2%; 95% CI: 1.4, 3.6%), with no cases with clinical or laboratory features of heparin-induced thrombocytopenia (HIT).4
**Pediatric population:** There is limited safety and efficacy information on the use of dalteparin in pediatric patients. If dalteparin is used in these patients, anti-Xa levels should be monitored. (see **WARNINGS AND PRECAUTIONS, Monitoring and Laboratory Tests**).

A large prospective study investigated the efficacy, safety and relation of dose to plasma anti-Xa activity of dalteparin in prophylaxis and therapy of arterial and venous thrombosis in 48 paediatric patients (from 31 weeks preterm to 18 years). The treatment duration was 3 to 6 months. In 10 patients who received dalteparin (95 ± 52 IU/kg sc qd) for thromboprophylaxis, no thromboembolic events occurred. The dose for antithrombotic therapy was 129 ± 43 IU/kg sc qd. In the 23 patients given dalteparin for primary antithrombotic therapy, 7/23 (30%) had complete recanalization, 7/23 (30%) had partial recanalization, and 9/23 (40%) had no recanalization. In the 8 patients administered dalteparin for secondary antithrombotic therapy following successful thrombolysis, recanalisation was maintained or improved. In the 5 patients receiving dalteparin following failed thrombolysis, no recanalization was seen. Minor bleeding, reported in 2/48 children (4%), resolved after dose reduction. Patient platelet counts ranged from 37,000/μl to 574,000/μl. A reduction in platelet count ≥50% of the initial value was not observed in any patient of this study; dalteparin doses required to achieve target anti Xa activities were inversely related to age; the predictability of the anticoagulant effect with weight adjusted doses appears to be reduced in children.

**Overweight population:** In a prospective, cohort study, 37 overweight patients were a priori stratified into three weight classes: (A) within 20 % of ideal body weight (IBW) (N=13), (B) 20-40% of IBW (n=14), and (C) greater than 40% of IBW (n=10). All patients, with serum creatinine levels <150µmol/L, received dalteparin sodium 200 IU/kg based on actual body weight subcutaneously once daily for the treatment of DVT or pulmonary embolism for a minimum of 5 days. All patients had peak anti-Xa levels measured 3-4 h following their Day 3 injection and trough anti-Xa levels measured immediately prior to injections on Day 3 and Day 5. The largest patient weighted 190 kg with a BMI of 58. Patients were stratified per weight in three different groups: A, B, C with mean daily doses of dalteparin respectively of 14,030 IU, 17,646 IU, and 23,565 IU. Mean (SD) trough anti-Xa levels on Day 3 were 0.12 (0.05) anti-Xa IU/ml for group A, 0.11 (0.03) anti-Xa IU/ml for group B and 0.11 (0.03) anti-Xa IU/ml for group C (p>0.2). Similar trough anti-Xa levels were observed on Day 5. Mean (SD) peak anti-Xa levels on Day 3 were 1.01 (0.20), anti-Xa IU/ml, 0.97 (0.21) anti-Xa IU/ml and 1.12 (0.22) anti-Xa IU/ml for groups A, B and C respectively. No thromboembolic or bleeding complications occurred during dalteparin therapy in any patients.

**Intensive Care Unit (ICU) Patients:** In a large international randomized, controlled multicenter study, the thromboprophylactic effect of dalteparin 5,000 IU once daily was compared to unfractionated heparin (UFH) 5,000 IU twice daily in 3746 critically ill medical and surgical patients who were admitted in the intensive care unit (ICU). The primary outcome was proximal leg deep vein thrombosis (DVT) as determined by periodic compression ultrasound. The median duration of study drug in both groups was 7 days. Proximal leg DVT was reported by 5.1% patients in the dalteparin group and 5.8% patients in the UFH group. The proportion of patients with pulmonary emboli was 1.3% in the dalteparin group and 2.3% in the UFH group. The rates of major bleeding and death in the hospital were 5.5% and 22.1% in the dalteparin group, and
5.6% and 24.5% in the UFH group. Of these parameters, only the rate of pulmonary emboli showed a statistically significant difference between treatment groups.

**STORAGE AND STABILITY**

Store at room temperature, (15 - 30ºC). The 25 000 IU/mL multi-dose vial must be used within 2 weeks after initial penetration.

**SPECIAL HANDLING INSTRUCTIONS**

No special handling required.

**DOSAGE FORMS, COMPOSITION AND PACKAGING**

**Dosage forms**
Solution for injection 10 000 IU (anti-Xa)/mL, ampoules 10 x 1 mL.
Solution for injection 25 000 IU (anti-Xa)/mL, 3.8 mL multi-dose vials.
Solution for injection 2 500 IU (anti-Xa)/mL, 4 mL single-dose vials.

Solution for injection 2 500 IU (anti-Xa)/0.2 mL, single dose syringes* 10 x 0.2 mL
Solution for injection 3 500 IU (anti-Xa)/0.28 mL, single dose syringes* 10 x 0.28 mL
Solution for injection 5 000 IU (anti-Xa)/0.2 mL, single dose syringes* 10 x 0.2 mL
Solution for injection 7 500 IU (anti-Xa)/0.3 mL, single dose syringes*, packages of 5
Solution for injection 10 000 IU (anti-Xa)/0.4 mL, single dose syringes*, packages of 5
Solution for injection 12 500 IU (anti-Xa)/0.5 mL, single dose syringes*, packages of 5
Solution for injection 15 000 IU (anti-Xa)/0.6 mL, single dose syringes*, packages of 5
Solution for injection 18 000 IU (anti-Xa)/0.72 mL, single dose syringes*, packages of 5

* Prefilled syringe with safety needle device

FRAGMIN may be administered subcutaneously (s.c.) or intravenously (i.v.)
### Composition

**Solution for injection:** 1 mL solution for injection contains:

<table>
<thead>
<tr>
<th>Component</th>
<th>Ampoule</th>
<th>Multi-dose vial</th>
<th>Single-dose Vial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalteparin sodium</td>
<td>10 000 IU (anti-Xa)</td>
<td>25 000 IU (anti-Xa)</td>
<td>2 500 IU (anti-Xa)</td>
</tr>
<tr>
<td>Sodium chloride*</td>
<td>q.s.</td>
<td>--</td>
<td>8.22 mg</td>
</tr>
<tr>
<td>Benzyl alcohol</td>
<td>--</td>
<td>14 mg</td>
<td>--</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
</tr>
<tr>
<td>Water for injection</td>
<td>ad 1 mL</td>
<td>ad 1 mL</td>
<td>ad 1 mL</td>
</tr>
</tbody>
</table>

*The hypotonicity is adjusted with sodium chloride. The amount is calculated from the result of the osmolality/anti-Xa activity.*

### Prefilled syringe with safety needle device

<table>
<thead>
<tr>
<th>Component</th>
<th>2 500 IU/0.2 mL</th>
<th>3 500 IU/0.28 mL</th>
<th>5 000 IU/0.2 mL</th>
<th>7 500 IU/0.3 mL</th>
<th>10 000 IU/0.4 mL</th>
<th>12 500 IU/0.5 mL</th>
<th>15 000 IU/0.6 mL</th>
<th>18 000 IU/0.72 mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalteparin sodium</td>
<td>Anti-Xa</td>
<td>Anti-Xa</td>
<td>Anti-Xa</td>
<td>Anti-Xa</td>
<td>Anti-Xa</td>
<td>Anti-Xa</td>
<td>Anti-Xa</td>
<td>Anti-Xa</td>
</tr>
<tr>
<td>LMWH*</td>
<td>0-2.7 mg</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sodium chloride***</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
<td>pH adjustment</td>
</tr>
<tr>
<td>Water for injection</td>
<td>ad 0.2 mL</td>
<td>ad 0.28 mL</td>
<td>ad 0.2 mL</td>
<td>ad 0.3 mL</td>
<td>ad 0.4 mL</td>
<td>ad 0.5 mL</td>
<td>ad 0.6 mL</td>
<td>ad 0.72 mL</td>
</tr>
</tbody>
</table>

* Low Molecular Weight Heparin Sodium

** The hypotonicity is adjusted with sodium chloride. The amount is calculated from the result of the osmolality/anti-Xa activity.
Potency: Potency is described in International anti-Xa units (IU). One unit (anti-Xa) of dalteparin sodium, weight average molecular weight 6000 Daltons, corresponds to the activity of one unit of the 1st International Standard for Low Molecular Weight Heparin with respect to inhibition of coagulation Factor Xa in plasma utilizing the chromogenic peptide substrate S-2765 (N-α-Benzylloxycarbonyl-D-arginyl-glycyl-arginine-pNA•2HCl).
PART II: SCIENTIFIC INFORMATION

PHARMACEUTICAL INFORMATION

Drug Substance

Proper name: Dalteparin sodium

Chemical name:
Sodium salt of depolymerized heparin obtained by nitrous acid degradation of heparin from pork intestinal mucosa. The majority of the components have a 2-O-sulfo-\(-\alpha\)-L-idopyranosuronic acid structure at the non-reducing end and a 6-O-sulfo-2,5-anhydro-D-mannitol structure at the reducing end of their chain. The molecular weight of 90% of the components is between 2 000 and 9 000 and the weight average molecular weight is about 6000 Daltons; the sulphur content is about 11%. The degree of sulphation is 2 to 2.5 per disaccharide unit.

Molecular formula and molecular mass:
FRAGMIN is produced through controlled nitrous acid depolymerization of sodium heparin from porcine intestinal mucosa. It is composed of strongly acidic sulphated polysaccharide chains with a weight average molecular weight of 6000 Daltons and about 90% of the material within the range 2000-9000.

Structural formula:

\[
\begin{align*}
\text{Physicochemical properties:} \\
& \text{White or yellowish white powder.} \\
& \text{Dalteparin sodium is soluble in water.} \\
& \text{pH (1% w/w solution) 5.0 - 7.5.}
\end{align*}
\]
Thromboprophylaxis in Conjunction with Surgery:

Study 1 Demographics and Trial Design

<table>
<thead>
<tr>
<th>Trial design</th>
<th>Diagnosis</th>
<th>Dosage, route of administration and duration</th>
<th>Study subjects (n=number)</th>
<th>Mean age (Range)</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-center, double-blind study comparing FRAGMIN to heparin</td>
<td>Patients undergoing hip replacement surgery</td>
<td>FRAGMIN 5000 IU qd s.c. starting the evening before surgery, or Heparin 5000 IU tid s.c., starting the morning of surgery. Treatment in both groups was continued for up to 9 days postoperatively.</td>
<td>140 enrolled, 139 treated. 136 underwent surgery: 67 FRAGMIN and 69 heparin.</td>
<td>66 yrs (range 42-87 yrs)</td>
<td>58.8% female</td>
</tr>
</tbody>
</table>

Study 1 Results:
In the intent-to-treat analysis, the incidence of proximal DVT was significantly lower for patients treated with FRAGMIN (dalteparin sodium injection) compared with patients treated with heparin (6/67 vs 18/69; p=0.012). Further, the incidence of pulmonary embolism detected by lung scan was also significantly lower in the group treated with FRAGMIN (9/67 vs 19/69; p=0.032).
### Study 2 Demographics and Trial Design

<table>
<thead>
<tr>
<th>Trial design</th>
<th>Diagnosis</th>
<th>Dosage, route of administration and duration</th>
<th>Study subjects (n=number)</th>
<th>Mean age (Range)</th>
<th>Gender</th>
</tr>
</thead>
</table>
| Multi-center, double-blind, randomized study: Postoperative dosing Comparing FRAGMIN to warfarin | Patients had undergone hip replacement surgery | Three groups:  
1) FRAGMIN 2500 IU s.c. starting within 2 h before surgery, followed by FRAGMIN 2500 IU s.c. at least 4 h (6.6 ± 2.3 h) after surgery. Then, 5000 IU qd s.c. on postop day 1.  
2) FRAGMIN 2500 IU s.c. at least 4 h (6.6 ± 2.4 h) after surgery only. Then, 5000 IU qd s.c. on postop day 1.  
3) Warfarin sodium the evening of the day of surgery, then continued daily at a dose adjusted for INR 2.0 to 3.0. Treatment for all groups: 4 to 8 days postoperatively, after which patients underwent bilateral venography. | 1501 enrolled, 1472 treated.  
1) 496 (first dose FRAGMIN before surgery),  
2) 487 (first dose FRAGMIN after surgery)  
3) 489 warfarin sodium. | 63 yrs (range 18-91 yrs) | 51.8% female |

### Study 2 Results:

For patients with interpretable venograms, the frequencies of deep vein thrombosis (DVT) in patients receiving preoperative and postoperative FRAGMIN and warfarin for all DVTs were 36 (10.7%) of 337, 44 (13.1%) of 336, and 81 (24.0%) of 338, respectively (p<0.001 for both preoperative and postoperative FRAGMIN vs. warfarin); for proximal DVT, 3 (0.8%) of 354, 3 (0.8%) of 358, and 11 (3.0%) of 363 (p= 0.04 and p= 0.03 for preoperative and postoperative FRAGMIN vs. warfarin, respectively).
Studies 3 and 4 Demographics and Trial Design

<table>
<thead>
<tr>
<th>Trial design</th>
<th>Diagnosis</th>
<th>Dosage, route of administration and duration</th>
<th>Study subjects (n=number)</th>
<th>Mean age (Range)</th>
<th>Gender</th>
</tr>
</thead>
</table>
| Two double-blind, randomized, controlled clinical trials | Patients undergoing major abdominal surgery  
Abdominal surgery patients at risk include those who are over 40 years of age, obese, undergoing surgery under general anesthesia lasting longer than 30 minutes, or who have additional risk factors such as malignancy or a history of deep vein thrombosis or pulmonary embolism. | FRAGMIN qd s.c. beginning prior to surgery and continuing for 5 to 10 days after surgery | Study 3.  
204 treated: 102 FRAGMIN, 102 placebo | 64 yrs (range 40-98 yrs) | 54.9% female |
|                                                        |                                                                                                     |                                                        | Study 4.  
391 treated: 195 FRAGMIN, 196 heparin | 59 yrs (range 30-88 yrs) | 51.9% female |

Studies 3 and 4 Results:
FRAGMIN was shown to reduce the risk of DVT in patients at risk for thromboembolic complications. As summarized in the following tables, FRAGMIN 2500 IU was superior to placebo and similar to heparin in reducing the risk of DVT.

Efficacy of FRAGMIN in the Prophylaxis of Deep Vein Thrombosis Following Abdominal Surgery

| Indication                                      | Dosing Regimen                        |                                                                 |
|------------------------------------------------|---------------------------------------|----------------------------------------------------------------
| All Treated Abdominal Surgery Patients         | FRAGMIN 2500 IU qd s.c.               | Placebo qd s.c.                                                |
| Treatment Failures in Evaluable Patients       | 102                                   | 102                                                             |
| Total Thromboembolic Events                    |                                        |                                                                 |
| Proximal DVT                                   | 4/91 (4.4%)¹                         | 16/91 (17.6%)                                                  |
| Distal DVT                                     | 0                                     | 5/91 (5.5%)                                                    |
| PE                                             | 4/91 (4.4%)                           | 11/91 (12.1%)                                                  |
|                                                | 0                                     | 2/91 (2.2%)                                                    |

¹ p-value = 0.008
² Both patients also had DVT, 1 proximal and 1 distal
Efficacy of FRAGMIN in the Prophylaxis of Deep Vein Thrombosis Following Abdominal Surgery

<table>
<thead>
<tr>
<th>Indication</th>
<th>Dosing Regimen</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FRAGMIN 2500 IU qd s.c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heparin 5000 IU bid s.c.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All Treated Abdominal Surgery Patients 195 196

<table>
<thead>
<tr>
<th>Treatment Failures in Evaluable Patients</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Thromboembolic Events</td>
<td>7/178 (3.9%)</td>
<td>7/174 (4.0%)</td>
</tr>
<tr>
<td>Proximal DVT</td>
<td>3/178 (1.7%)</td>
<td>4/174 (2.3%)</td>
</tr>
<tr>
<td>Distal DVT</td>
<td>3/178 (1.7%)</td>
<td>3/174 (1.7%)</td>
</tr>
<tr>
<td>PE</td>
<td>1/178 (0.6%)</td>
<td>0</td>
</tr>
</tbody>
</table>

1 p-value = 0.74

Treatment of Deep Vein Thrombosis (DVT)

Study 1: Study Demographics and Trial Design

<table>
<thead>
<tr>
<th>Trial design</th>
<th>Diagnosis</th>
<th>Dosage, route of administration and duration</th>
<th>Study subjects (n=number)</th>
<th>Mean age</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-blind, randomized, controlled</td>
<td>Phlebographically proven DVT</td>
<td>Dosing: sc q12h, at least 5 d.</td>
<td>54 patients</td>
<td>61.5 yrs</td>
<td>57.4% male</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Initial dose to achieve anti-Factor Xa levels of 0.5-0.8 IU/mL, adjusted Day 2 or later according to plasma anti-Factor Xa activity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FRAGMIN: Mean initial dose 87 IU/kg, adjusted dose 90 IU/kg (i.e. 4000-10000IU)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heparin: Mean initial dose 170 IU/kg, adjusted dose 219 IU/kg (i.e. 8000-20000IU)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Warfarin treatment was started the day of inclusion.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Study 1 Results:
Subcutaneous FRAGMIN and heparin in DVT were found to be equally safe and efficacious. The Heparin group required more dose adjustments. Leg pain disappeared more rapidly in patients receiving FRAGMIN.
Extended Treatment of Symptomatic Venous Thromboembolism (VTE) to Prevent Recurrence of VTE in Patients with Cancer

Study Demographics and Trial Design

<table>
<thead>
<tr>
<th>Trial design</th>
<th>Diagnosis</th>
<th>Dosage, route of administration and duration</th>
<th>Study subjects (n=number)</th>
<th>Median age</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomized open-label, parallel group, 48 center, active-controlled study</td>
<td>Patients with cancer and newly diagnosed, objectively confirmed acute deep vein thrombosis (DVT) and/or pulmonary embolism (PE)</td>
<td>FRAGMIN: 6 months - (200 IU/kg s.c. once daily for 1 month followed by ~150 IU/kg s.c. once daily for 5 months) or FRAGMIN: For a minimum of 5 days 200 IU/kg s.c. once daily and simultaneous oral anticoagulation (coumarin derivatives) with a Vitamin K antagonist. Oral anticoagulation was maintained for 6 months adjusted for INR 2.0-3.0.</td>
<td>676 patients FRAGMIN: 338 (53.3% completed) Oral coagulation: 339 (48.7% completed)</td>
<td>64 yrs</td>
<td>51.5% female</td>
</tr>
</tbody>
</table>

Study Results:
A total of 27 (8.0%) and 53 (15.7%) patients in the experimental and control arms, respectively, experienced at least one episode of an adjudicated, symptomatic DVT and/or PE during the 6-month study period. In the intent-to-treat population, the primary comparison of the cumulative probability of the first VTE recurrence over the 6-month study period was highly statistically significant (2-sided log-rank test, p=0.0017) in favor of the experimental regimen. The estimated cumulative probability of recurrence at 6 months was reduced from 0.172 in the control arm to 0.087 in the experimental arm, reflecting a 52% reduction in the relative risk of VTE (RR=0.48; 95% CI, 0.30-0.77; likelihood test, p=0.0016).
Unstable Coronary Artery Disease, i.e. Unstable Angina and Non-Q-Wave Myocardial Infarction:

Study 1: Study Demographics and Trial Design

<table>
<thead>
<tr>
<th>Trial design</th>
<th>Diagnosis</th>
<th>Dosage, route of administration and duration</th>
<th>Study subjects (n=number)</th>
<th>Mean age (Range)</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-blind, randomized, placebo-controlled</td>
<td>Patients recently experienced unstable angina with EKG changes or non-Q-wave myocardial infarction (MI). Unstable angina was defined to include only angina with EKG changes</td>
<td>FRAGMIN: 120 IU/kg q12h s.c. Placebo q12h s.c. Except when contraindicated, concurrent treatment with Aspirin (75 mg once daily) and beta blockers. Treatment was initiated within 72 h of the event; most received treatment within 24 h and continued for 5 to 8 days.</td>
<td>1506 patients enrolled and treated; FRAGMIN 746, placebo 760. 99.7% white.</td>
<td>68 yrs (range 40-90 yrs)</td>
<td>63.9% male</td>
</tr>
</tbody>
</table>

Study 1 Results: The combined incidence of the double endpoint of death or myocardial infarction was lower for FRAGMIN compared with placebo at 6 days after initiation of therapy. These results were observed in an analysis of all-randomized and all-treated patients. The combined incidence of death, MI, need for intravenous (i.v.) heparin or i.v. nitroglycerin, and revascularization was also lower for FRAGMIN than for placebo (see table below).

Efficacy of FRAGMIN in the Prophylaxis of Ischemic Complications in Unstable Angina and Non-Q-Wave Myocardial Infarction

<table>
<thead>
<tr>
<th>Indication</th>
<th>Dosing Regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Treated Unstable Angina and Non-Q-Wave MI Patients</td>
<td>FRAGMIN 120 IU/kg/12 hr s.c. Placebo q 12 hr s.c.</td>
</tr>
<tr>
<td>Primary Endpoints - 6 day timepoint Death, MI</td>
<td>746 760</td>
</tr>
<tr>
<td>Secondary Endpoints - 6 day timepoint Death, MI, i.v. heparin, i.v. nitroglycerin, Revascularization</td>
<td>13/741 (1.8%) 1 36/757 (4.8%) 59/739 (8.0%) 1 106/756 (14.0%)</td>
</tr>
</tbody>
</table>

1 p-value = 0.001
Study 2: Study Demographics and Trial Design

<table>
<thead>
<tr>
<th>Trial design</th>
<th>Diagnosis</th>
<th>Dosage, route of administration and duration</th>
<th>Study subjects (n=number)</th>
<th>Mean age (Range)</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomized, controlled trial to evaluate long-term treatment with FRAGMIN</td>
<td>Patients recently experienced unstable angina with EKG changes or non-Q-wave myocardial infarction (MI).</td>
<td>FRAGMIN: 120 IU/kg q12h s.c. or Heparin: APTT-adjusted dosage. Except when contraindicated, were treated concurrently with Aspirin (100 to 165 mg/day). 1-week (5 to 8 days) treatment</td>
<td>1499 enrolled, 1482 treated; FRAGMIN 751, heparin 731. 96.0% white.</td>
<td>64 yrs (range 25-92 yrs)</td>
<td>64.2% male</td>
</tr>
</tbody>
</table>

Study 2 Results: The incidence of the combined triple endpoint of death, myocardial infarction, or recurrent angina during this 1-week treatment period (5 to 8 days) was 9.3% for FRAGMIN and 7.6% for heparin (p=0.323).

Reduction of Deep Vein Thrombosis in Hospitalized Patients with Severely Restricted Mobility during Acute Illness.

Study Demographics and Trial Design

<table>
<thead>
<tr>
<th>Trial design</th>
<th>Diagnosis</th>
<th>Dosage, route of administration and duration</th>
<th>Study subjects (n=number)</th>
<th>Mean age (Range)</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-blind, multi-center, randomized, placebo-controlled trial</td>
<td>DVT in hospitalized patients with severely restricted mobility</td>
<td>FRAGMIN 5000 IU or placebo s.c. qd during Days 1 to 14 of the study.</td>
<td>3681 enrolled and treated: FRAGMIN: 1848 Placebo: 1833 92.1% white</td>
<td>69 yrs (range 26-99 yrs)</td>
<td>51.9% female</td>
</tr>
</tbody>
</table>

Study Results: The primary efficacy endpoint was defined as at least one of the following within Days 1 to 21 of the study: asymptomatic proximal DVT (diagnosed by compression ultrasound), a confirmed symptomatic DVT, a confirmed pulmonary embolism or sudden death. The primary endpoint was evaluated at Day 21, and the follow-up period was up to Day 90. These patients were ≥40 years of age with an acute medical condition requiring a projected hospitalization of ≥ 4 days and had ≤3 days of prior immobilization and were confined to bed during waking hours.
The study included patients with congestive heart failure (NYHA Class III or IV), acute respiratory failure not requiring ventilatory support, and the following acute conditions with at least one risk factor occurring in >1% of treated patients: acute infection (excluding septic shock), acute rheumatic disorder, acute lumbar or sciatic pain, vertebral compression, or acute arthritis of the lower extremities. Risk factors include > 75 years of age, cancer, previous DVT/PE, obesity and chronic venous insufficiency.

When given at a dose of 5000 IU once a day s.c., FRAGMIN significantly reduced the incidence of thromboembolic events including verified DVT by Day 21 (see table below). The prophylactic effect was sustained through Day 90. Decrease mortality due to thromboembolic events and complications has not been demonstrated.

**Efficacy of FRAGMIN in the reduction of Deep Vein Thrombosis in Hospitalized Patients with Severely Restricted Mobility During Acute Illness**

<table>
<thead>
<tr>
<th></th>
<th>Dalteparin, n/N (%)</th>
<th>Placebo, n/N (%)</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary end point</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(day 21)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venous thromboembolism and sudden death</td>
<td>42/1518 (2.77)</td>
<td>73/1473 (4.96)</td>
<td>0.55 (0.38–0.80)</td>
</tr>
<tr>
<td>Sudden death</td>
<td>5/1829 (0.27)</td>
<td>3/1807 (0.17)</td>
<td>1.65 (…)</td>
</tr>
<tr>
<td>Pulmonary embolism, fatal</td>
<td>0/1829 (0.00)</td>
<td>2/1807 (0.11)</td>
<td>0.00 (…)</td>
</tr>
<tr>
<td>Pulmonary embolism, symptomatic</td>
<td>5/1759 (0.28)</td>
<td>4/1740 (0.23)</td>
<td>1.22 (…)</td>
</tr>
<tr>
<td>Deep vein thrombosis: distal, symptomatic</td>
<td>3/1759 (0.17)</td>
<td>4/1739 (0.23)</td>
<td>0.74 (…)</td>
</tr>
<tr>
<td>Deep vein thrombosis: proximal, symptomatic</td>
<td>2/1759 (0.11)</td>
<td>7/1739 (0.40)</td>
<td>0.28 (…)</td>
</tr>
<tr>
<td>Deep vein thrombosis: proximal, asymptomatic</td>
<td>27/1507 (1.79)</td>
<td>53/1453 (3.65)</td>
<td>0.48 (0.31–0.77)</td>
</tr>
<tr>
<td>Secondary end point at day 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>8/1846 (0.43)</td>
<td>7/1831 (0.38)</td>
<td>1.13 (0.41–3.12)</td>
</tr>
<tr>
<td>Secondary end point at day 21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep vein thrombosis: proximal and symptomatic distal</td>
<td>32/1508 (2.12)</td>
<td>64/1464 (4.37)</td>
<td>0.49 (0.32–0.74)</td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>43/1829 (2.35)</td>
<td>42/1807 (2.32)</td>
<td>1.01 (0.66–1.54)</td>
</tr>
<tr>
<td>Secondary endpoint at day 90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptomatic venous thromboembolism (all deep vein thrombosis and pulmonary embolism)</td>
<td>15/1615 (0.93)</td>
<td>21/1583 (1.33)</td>
<td>0.70 (0.36–1.35)</td>
</tr>
<tr>
<td>All symptomatic pulmonary embolism</td>
<td>5/1615 (0.31)</td>
<td>6/1583 (0.38)</td>
<td>0.82 (0.25–2.67)</td>
</tr>
<tr>
<td>All symptomatic deep vein thrombosis</td>
<td>10/1614 (0.62)</td>
<td>15/1579 (0.95)</td>
<td>0.65 (0.29–1.45)</td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>107/1747 (6.12)</td>
<td>103/1715 (6.01)</td>
<td>1.02 (0.78–1.33)</td>
</tr>
</tbody>
</table>

RR indicates relative risk. Only 1 event per patient (most severe) was recorded. 95% CIs were not produced if <5 patients in either treatment group experienced an event.
DETAILED PHARMACOLOGY

Drug Biochemistry

FRAGMIN is a low molecular weight heparin produced on a large scale by a highly reproducible method based on partial nitrous acid depolymerization of heparin. FRAGMIN has a weight average molecular weight of 6000 Daltons with about 90% of the material between 2000-9000. FRAGMIN contains molecules with high and with low affinity for antithrombin. The figure below shows the molecular weight distribution of FRAGMIN and standard heparin.

Animal Pharmacokinetics

Distribution and clearance: The organ distribution of tritium-labelled dalteparin sodium was determined in rats and compared to heparin. Regardless of the dose injected or the route of administration (i.v. or s.c.) the highest deposit of radioactivity was found in the liver (up to 19%), followed by the kidney and intestine. On the basis of specific activity (dpm/g tissue), the kidney had the highest concentration of radioactive material. No significant difference between the tissue distribution of heparin and dalteparin sodium were seen after 72 hours. At 72 hours, the total amount of radioactivity remaining in the body (dose 600 IU/kg) was 12.3% for dalteparin sodium and 13.5% for heparin, and showed a similar pattern to that seen at 4 hours.

It has been demonstrated that heparin is eliminated from plasma via a saturable cellular clearance mechanism (i.e. binding and/or uptake into endothelial or reticuloendothelial cells) and also via a non-saturable renal clearance mechanism.

In a study designed to compare the elimination kinetics of heparin and dalteparin sodium in the rabbit, it was demonstrated that cellular clearance of dalteparin sodium is considerably less important than for heparin. Saturation of the reticuloendothelial system prior to dalteparin sodium administration had no effect on its plasma elimination rate. In contrast, under similar conditions, the plasma half-life of heparin was prolonged by 3-4 times.

In the dog, more than 70% of the administered radioactivity was excreted in the urine in 24 hours, independent of application route.

Human Pharmacodynamics

Primary hemostatic effects: Specific activity of FRAGMIN is consistent with that of unfractionated heparin regarding anti-Xa activity, but differs in its effects on APTT, see table below.

<table>
<thead>
<tr>
<th>Specific activity</th>
<th>APTT</th>
<th>Anti-Xa</th>
<th>Ratio anti-Xa APTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRAGMIN*</td>
<td>60</td>
<td>165</td>
<td>2.6</td>
</tr>
<tr>
<td>Heparin</td>
<td>170</td>
<td>170</td>
<td>1</td>
</tr>
</tbody>
</table>

* According to the 1st International Standard of LMW heparin. APTT 60 IU/mg, anti-Xa 165 IU/mg.
Following the continuous i.v. infusion in 8 healthy volunteers of FRAGMIN or heparin in the dose 20 IU/kg/hr, important differences were noted. After 10 hours, anti-Xa levels (mean 1.80) were significantly higher in the FRAGMIN group, than in the heparin group (mean 0.86). APTT was only moderately elevated (increase 88%) in the FRAGMIN group, as compared to the heparin group (increase 263%, see figure below).

![Graph showing Anti-Xa activities and APTT after continuous infusion of 20 IU/kg/hour of Fragmin (LMWH) and 20 IU/kg/hour of heparin (UFH).]

Secondary pharmacological effects: Heparin administration releases lipoprotein lipase from tissue sites into the circulation, resulting in a profound derangement of lipoprotein metabolism. Lipoprotein lipase catalyses the hydrolysis of plasma triglycerides at the capillary endothelium, and the products of lipolysis are taken up directly by the tissues. When heparin has displaced the lipases from their tissue sites, hydrolysis proceeds in the circulating blood with the production of free fatty acids which are subsequently removed with a different tissue distribution. An extensive intravascular lipolysis rather than a controlled hydrolysis and removal of triglycerides in the capillary vessels may have an impact on the distribution of lipid energy between different organs.

FRAGMIN and heparin were administered intravenously to 6 healthy volunteers who simultaneously received a continuous infusion of the fat emulsion, Intralipid®. The mean Intralipid concentration decreased by 83% after heparin and by 38% after FRAGMIN (p<0.001). FRAGMIN was associated with a smaller increase of free fatty acids (p<0.05) and plasma LPL activities (p<0.01) than was heparin.

In a study of 70 patients with chronic end-stage renal failure followed over a period of 12 months, a significant (p<0.05) increase in the number of hypertriglyceridemic patients was observed in the heparin-treated group compared to patients treated with FRAGMIN.

In a number of studies, it has been noted that low molecular weight heparins do not affect platelet function to the same extent as does heparin. In a randomized single-blind, cross-over study, heparin resulted in a striking decrease in platelet adhesion to collagen in all patients, while FRAGMIN had no such effect.
The heparin mobilizable-pool of platelet factor 4 (PF-4) is of interest because its mobilization by heparin may be relevant to the antithrombotic effect of heparin. Five healthy volunteers were recruited for an i.v. study and 8 for an s.c. study. The double-blind, cross-over studies assessed how heparin and FRAGMIN affected the pool. After various experimental treatments with heparin and FRAGMIN, the level of PF-4 still mobilizable by a challenging dose of 60 U/kg heparin was analyzed.

Heparin liberated PF-4 to a significantly higher extent than FRAGMIN. Plasma F-4 level was significantly higher following i.v. administration of heparin and FRAGMIN (214 vs. 154 ng/mL respectively, at 5 min. post-administration; p<0.02). After the heparin challenge, significantly more plasma PF-4 was found for the FRAGMIN groups for both i.v. and s.c. administration. This suggests that the heparin mobilizable pool of PF-4 is more severely depleted by heparin treatment, than by FRAGMIN treatment.

Other studies have confirmed that FRAGMIN has less effect on hemostasis. Other parameters which, when tested, have shown a difference from heparin in some studies are ATIII, Factor VIII, thrombin time, whole blood activated clotting time (WBACT), and fibrin monomers in hemodialysis studies.

FRAGMIN administration appears to gives rise to transient elevation of liver transaminases to the same extent as heparin. There is a single report of the levels not returning to normal after withdrawal of treatment. Levels nonetheless returned to normal after 2 weeks.
Human Pharmacokinetics

*Intravenous injection:* In 8 healthy volunteers, a single i.v. injection of FRAGMIN in the doses 40 and 60 IU/kg showed that the half-life was independent of the dose and was approximately 2 hours, i.e twice as long as for heparin. Both doses of FRAGMIN were eliminated according to first order kinetics. There was a direct proportionality between the dose and the AUC obtained. APTT was moderately prolonged in a dose-dependent way, but had returned to normal after 4 hours, when still measurable anti-Xa levels existed.

While it is known that heparin exhibits striking dose-dependent kinetics, there have been differing conclusions as to whether FRAGMIN exhibits dose-dependent or independent kinetics. Whatever the case, it is apparent that the kinetics of FRAGMIN differ remarkably from those of heparin. The following data indicates a mild dose-dependent response for 2 doses of FRAGMIN, both of which have a half-life \( t_2 \) in excess of twice the heparin value. The volumes of distribution between different doses of FRAGMIN and heparin do not differ significantly.

<table>
<thead>
<tr>
<th>Dose (IU/kg)</th>
<th>( t_2 ) (min)</th>
<th>AUC (IU/ML x min)</th>
<th>Clearance (IU/ML/min)</th>
<th>( V_d ) (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heparin KabiVitrum (40)</td>
<td>57 ± 12</td>
<td>71 ± 18</td>
<td>39 ± 14</td>
<td>3.13 ± 0.88</td>
</tr>
<tr>
<td>Fragmin (40)</td>
<td>***</td>
<td>126 ± 21</td>
<td>191 ± 61</td>
<td>15 ± 5</td>
</tr>
<tr>
<td>Fragmin (60)</td>
<td>ns</td>
<td>139 ± 28</td>
<td>274 ± 64</td>
<td>15 ± 3</td>
</tr>
</tbody>
</table>

Pharmacokinetic parameters after single intravenous injections of Heparin (mean ± SD n = 8).
***p=.0001 of difference between heparin 40 IU/kg and Heparin fragment Kabi 2165 40 IU/kg or 60 IU/kg.

A further study, extending the dose range, confirmed the slight dose-dependent kinetics of FRAGMIN. At doses of 30 and 120 IU/kg, \( t_2 \) were found to be 88 ± 77 min., and 154 ± 16 min, respectively. These results, indicating that kinetics may be slightly dose-dependent, do not alter the recommended dosing regimens.

*Subcutaneous injection:* The plasma concentration of dalteparin sodium following s.c. administration is easily predicted since there is a direct relationship between the administered dose and the anti-Xa activity in plasma (measured as area under the activity curve). It has been demonstrated that following i.v. administration, FRAGMIN has a plasma half-life which is twice that of heparin. The pharmacokinetic profile of FRAGMIN administered s.c. is less dose-dependent than that of heparin.

In a study of 6 volunteers, the half-life after s.c. injection of FRAGMIN in the doses 2500, 5000 and 10 000 IU anti-Xa, was 3.4, 3.3 and 3.9 hours respectively. Areas under the curve (AUC) for the 3 dosages were 1.70, 3.77 and 9.33, respectively.
**Distribution and clearance:** A study of 8 healthy volunteers in which FRAGMIN 5000 IU was administered s.c. twice daily for several days revealed no cumulative effect on APTT, thrombin time or residual Factor Xa activity in plasma.

In the animal studies, the kidney was implicated as the major organ for removal of the drug. FRAGMIN clearance from kidneys has been confirmed from studies in the administration of FRAGMIN to patients with impaired renal function. The $t_2$ for anti-Xa activity in these patients was 6.3 - 7 hours, much longer than for healthy volunteers.

**Bioavailability:** The bioavailability of FRAGMIN administered i.v. cannot be measured directly. Rather it is the anticoagulant activity which is determined. By definition, IU of FRAGMIN are assessed as anti-Xa activity after injection of the drug. Therefore the bioavailability of i.v. administered FRAGMIN is expected to be near 100%, as nearly all of the injected drug is free to bind with ATIII. Strong association of FRAGMIN with other plasma proteins has not been reported. The bioavailability of FRAGMIN administered by other routes can be assessed as a comparison to the different anti-Xa levels achieved.

I.v. and s.c. administration of FRAGMIN lead to similar pharmacokinetic values. Compared with heparin, FRAGMIN is absorbed from the subcutaneous depot to a much greater extent; 80-90% compared with 10-20% for heparin.

A cross-over study in 6 healthy volunteers, who received s.c. and i.v. injections of FRAGMIN in the dose 120 anti-Xa IU/kg gave the following results: the half-life after i.v. injection was 199 ± 17 min (mean ± SD). The volume of distribution was 3.4 ± 0.5 L and the total clearance 20.5 ± 2.5 mL/min. The elimination of the anti-Xa activity was monoexponential and a first order process. As previously determined, the half-life after s.c. injection was longer than heparin (228 ± 40 min). The absorption rate was the rate limiting step. Peak levels were consistent with other studies and reached after 4 hours, when anti-Xa levels of 0.6 IU ± 0.1 were obtained. The bioavailability of FRAGMIN administered s.c. was 87 ± 6%, from a comparison of s.c. and i.v. administration AUCs.

**TOXICOLOGY**

**Acute Toxicity**

No LD$_{50}$ has been determined in studies of single lethal acute doses given to mice. Given both i.v. and s.c., doses of 100 000 IU/kg were tolerated. Any deaths recorded were the result of hemorrhagic complications at the s.c. injection site.
Short-term Toxicity

Rats treated with large doses administered s.c. once daily for 9 consecutive days registered increases in platelets and bleeding time, and injection site hematomas in some animals at doses of 500 - 1000 IU/kg/day. At higher doses, 5000 - 20 000 IU/kg/day, bleeding from injection site hematoma could prove fatal, and decreases in Hb, PCV and RBC were recorded.

Long-term Toxicity

Beagle dogs treated with 250 - 1000 IU/kg/day administered s.c. for 26 weeks yielded no serious toxicological changes.

Some dogs were reported to have enlarged livers at the higher dose levels, and for heparin at 250 IU/kg/day, although no significant histopathological liver changes were observed.

Microradiographic examination and determination of gravity and specific ash of the skeletons of the dogs showed significant differences between treated and control groups. Therefore, dalteparin sodium has a weak osteopenic effect. Heparin has a comparable effect.

Dalteparin sodium was administered s.c. once daily to Sprague Dawley rats at the dose levels of 250, 500 or 1000 IU/kg/day for 26 weeks. Twenty rats/sex/group were killed at the end of the treatment period and the remaining 10 animals/sex/group were killed after a 6-week recovery period. There was no evidence of any systemic toxicity and the only significant finding was the presence of dose-related and reversible small hemorrhages at the injection sites. A dose-related and proportional increase in plasma anti-Xa activity was seen during the study, with peak levels attained at about 1 hour post dose.

In a 52-week intravenous toxicity study, beagle dogs (5 males and 5 females/group) received dalteparin sodium i.v. at the dose levels of 300, 1000 or 3000 IU/kg/day for 52 weeks. At the end of the treatment period, 4 dogs/sex/group were killed and the remaining dogs (1 animal/sex/group) were kept untreated for 5 weeks prior to sacrifice. Dalteparin sodium was well tolerated in dogs after repeated i.v. administration of doses up to 1000 IU/kg/day. Subcutaneous hemorrhages at the injection sites occurred in all drug-treated groups, with dose-dependency. At the highest dose level (3000 IU/kg/day), slightly increased liver weights were observed in males and a decrease in the ratio of cortical bone versus bone width was found in females.

In the mid and high-dose groups, both sexes showed a decrease in serum glutamate-oxaloacetate transaminase (SGOT) activity and an increase in globulin fraction. Male animals in the active treatment groups showed increased levels of serum potassium, cholesterol and phospholipids, decrease in gamma globulin fraction ratio, and an increase in plasma glucose. Females of high dose group showed a decrease in total protein and an increase in chlorine.

No organ toxicity was revealed in any of the toxicity studies. No significant adverse changes were found in the reproductive toxicity studies and no mutagenic effect was detected.
**Human Toxicology:** Toxicologically, FRAGMIN (dalteparin sodium) exhibits a dose-related effect on bleeding. In human studies, this effect manifests itself in bleeding side effects ranging from mild events such as injection site hematoma, wound hematoma, epistaxis, haematuria, bruising, petechiae, oral mucosal bleeding, vaginal bleeding, anal bleeding, through to more serious events. While injection site hematomas occur at 5%, major bleedings are rare.

Both FRAGMIN and heparin give rise to similar transient elevation of the liver transaminases. Asymptomatic increases in transaminase levels (SGOT/AST and SGPT/ALT) greater than three times the upper limit of normal of the laboratory reference range have been reported in 1.7 and 4.3%, respectively, of patients during treatment with FRAGMIN. There is a single report of the levels not returning to normal after withdrawal of treatment. Levels nonetheless returned to normal after 2 weeks. This may be indicative of clinically important effect on the liver, the significance of which is not entirely clear, as FRAGMIN is known to be distributed less in the liver than heparin.

Heparin-treated patients are known to be at risk for the development of osteoporosis after long-term, high-dose therapy. A similar risk is not known for FRAGMIN, however patients on long-term therapy may also be at risk.
REFERENCES


22. Lee AYY, Levine MN, Baker RI, Bowden C, Kakkar A, Prins M, Rickles FR, Julian JA,


PART III: CONSUMER INFORMATION

Pr FRAGMIN®
(Dalteparin Sodium Injection)

This leaflet is part III of a three-part "Product Monograph" published when FRAGMIN was approved for sale in Canada and is designed specifically for Consumers. This leaflet is a summary and will not tell you everything about FRAGMIN. Contact your doctor or pharmacist if you have any questions about the drug.

ABOUT THIS MEDICATION

What is FRAGMIN used for:
FRAGMIN is used to prevent blood clotting (coagulation) when surgery is performed, to treat the acute formation of blood clots in deep veins, to treat symptomatic blood clots to prevent recurrence of the clots in patients with cancer, to treat unstable coronary artery disease, to prevent clotting in those at risk when mobility is restricted during acute illness, and to prevent clotting in blood dialysis and filtration equipment in connection with acute kidney failure or kidney disease.

What it does:
FRAGMIN is a type of medicine called low molecular weight heparin. FRAGMIN can help keep the blood from forming clots or keep a clot from getting larger. FRAGMIN works by making thrombin inactive in the body. Thrombin is an ingredient which contributes to blood clotting.

When it should not be used:
It is necessary that you advise your doctor of any serious medical problems you have had or currently have, as these conditions could affect the action of FRAGMIN.

Because benzyl alcohol may cross the placenta, FRAGMIN 25 000 IU 3.8 mL Multi-Dose vials which are preserved with benzyl alcohol should not be used in pregnant women.

If you have had or currently suffer from any of the conditions listed below, it is necessary that you inform your doctor before starting treatment:
- Allergy to FRAGMIN or any of its constituents or to other low molecular weight heparins and/or heparin
- Bleeding due to acute gastroduodenal ulcer (stomach or intestinal bleed/ulcer)
- A history of cerebral hemorrhage (bleeding in or against the brain)
- A severe blood clotting disorder (hemorrhagic diathesis)
- A history of thrombocytopenia (decrease in the number of platelets)
- Bacterial infection of the heart (septic endocarditis)
- High blood pressure
- Disorders of the retina of the eye due to diabetes or bleeding
- Injuries to and/or operations on the central nervous system, eyes, ears
- Any other diseases that could involve an increased risk of bleeding.

What the medicinal ingredient is:
Dalteparin sodium

What the important nonmedicinal ingredients are:
The nonmedicinal ingredients in FRAGMIN are:

Ampoule: Sodium chloride, hydrochloric acid /sodium hydroxide (for pH adjustment) and water for injection.

Multi-dose vial: benzyl alcohol, hydrochloric acid /sodium hydroxide (for pH adjustment) and water for injection.

Single-dose Vial: Sodium chloride, hydrochloric acid /sodium hydroxide (for pH adjustment) and water for injection.

Prefilled syringe with safety needle device: Sodium chloride (2500 IU/0.2 mL and 3500 IU/.28mL only), hydrochloric acid /sodium hydroxide (for pH adjustment) and water for injection.

What dosage forms it comes in:
Solution
10 000 IU (anti-factor Xa)/1 mL, Ampoule
25 000 IU (anti-factor Xa)/mL 3.8 mL, Multi-Dose Vial
2 500 IU (anti-factor Xa)/mL 4 mL, Single-Dose Vial

Prefilled syringe with safety needle device
2 500 IU (anti-factor Xa)/0.2 mL
3 500 IU (anti-factor Xa)/0.28 mL
5 000 IU (anti-factor Xa)/0.2 mL
7 500 IU (anti-factor Xa)/0.3 mL
10 000 IU (anti-factor Xa)/0.4 mL
12 500 IU (anti-factor Xa)/0.5 mL
15 000 IU (anti-factor Xa)/0.6 mL
18 000 IU (anti-factor Xa)/0.72 mL
WARNINGS AND PRECAUTIONS

It is necessary that you follow the instructions of your doctor or nurse carefully. Give yourself the injections prescribed for the entire time period specified by your doctor.

Do not take any drugs other than those prescribed by your doctor while you are taking FRAGMIN.

If you need to consult with another doctor or see your dentist, be absolutely sure to tell them that you are being treated with FRAGMIN.

FRAGMIN should not be administered intra-muscularly.

BEFORE you use FRAGMIN talk to your doctor or pharmacist if you have had or currently have any of the conditions listed below:
- Artificial heart valves
- Heart disease, including angina and recent heart attack.

If you are taking any medications (such as Acetylsalicylic acid (ASA), other drugs to reduce blood clotting such as warfarin or non-steroidal anti-inflammatory drugs (NSAIDS; drugs used to treat painful and/or inflammatory conditions of muscles or joints)), including that you buy without a prescription (see Interactions with this medication)
- Bleeding disorders (such as hemophilia)
- Liver or kidney problems

Pregnancy: If you are pregnant or breast feeding, you should tell your doctor so that the possible risks to you and your child can be assessed.

INTERACTIONS WITH THIS MEDICATION

Certain medications may intensify the anticoagulant effect (e.g., blood thinning effect) of FRAGMIN. Therefore, it is important for you to advise your doctor if you are taking any medications such as:
- Acetylsalicylic acid (ASA)
- other drugs to reduce blood clotting such as warfarin or non-steroidal anti-inflammatory drugs (NSAIDS; drugs used to treat painful and/or inflammatory conditions of muscles or joints)
- platelet inhibitors
- medication that you buy without a prescription

PROPER USE OF THIS MEDICATION

FRAGMIN is obtained by prescription only. You must use FRAGMIN as instructed by your doctor. FRAGMIN is administered as an injection underneath the surface of the skin (subcutaneous).

FRAGMIN should be inspected visually for clarity, particulate matter, precipitation, discolouration, and leakage prior to administration whenever solution and container permit. Do not use product if mixture (solution) shows haziness, particulate matter, discolouration or leakage.

In Hospital

General Surgery

Your doctor or nurse will give you your first injection of FRAGMIN subcutaneously 1-2 hours before the operation to prevent problems with blood clotting. After the operation, you will receive a subcutaneous injection each morning until you become mobile, in general 5-7 days or longer.

General Surgery Associated With Other Risk Factors

Your doctor or nurse will give you your first injection of FRAGMIN subcutaneously the evening before the operation to prevent blood-clotting problems. After the operation, you will receive a subcutaneous injection that night and an injection each successive night thereafter until you become mobile.

As an alternative, your doctor or nurse may divide the initial dose and give you your first subcutaneous injection of FRAGMIN 1-2 hours before your operation followed by another injection no sooner than 4 hours after your operation, but at least 8 hours after your previous injection. Each day thereafter, you will receive an injection until you become mobile.

Elective Hip Surgery

Your doctor or nurse will give you your first injection of FRAGMIN subcutaneously the evening before the operation to prevent blood clotting problems. After the operation, you will receive a subcutaneous injection that night and an injection each successive night thereafter until you become mobile.

As an alternative, your doctor or nurse may give you a subcutaneous injection of FRAGMIN 1-2 hours before the operation. Regardless of whether or not you get an injection before your operation, you will then get an injection no sooner than 4-8 hours after your operation. Each day thereafter, you will receive an injection until you become mobile.

Treatment of Acute Deep Vein Thrombosis

Your doctor or nurse will give you a subcutaneous injection once or twice a day for approximately 5 days. Alternatively, you may receive your dose of FRAGMIN by intravenous injection.

Extended Treatment of Symptomatic Venous Thromboembolism (VTE) to Prevent Recurrence of VTE in Patients with Cancer

Your doctor or nurse will give you a subcutaneous injection once a day for up to 6 months.
IMPORTANT: PLEASE READ

Unstable Coronary Artery Disease (Unstable Angina and Non-Q-Wave Myocardial Infarction)

Your doctor or nurse will give you a subcutaneous injection twice a day (once about every 12 hours) for up to 6 days.

Medical Patients with Restricted Mobility

Your doctor or nurse will give you a subcutaneous injection once a day for up to 14 days.

At Home

It may be necessary for you to continue your treatment with FRAGMIN at home.

BEFORE YOUR RELEASE FROM THE HOSPITAL, YOUR DOCTOR OR NURSE WILL SHOW YOU HOW TO GIVE YOURSELF THE FRAGMIN INJECTIONS. IT IS VERY IMPORTANT THAT YOU FOLLOW THE INSTRUCTIONS EXACTLY. IF THERE IS ANYTHING YOU DON’T UNDERSTAND OR WOULD LIKE CLARIFIED, MAKE SURE TO ASK YOUR DOCTOR OR NURSE FOR MORE INFORMATION SO THAT WHEN YOU GO HOME, YOU ARE COMFORTABLE SELF-ADMINISTERING FRAGMIN.

Please note that there are many different types of syringes that you can use with the single-dose vial, the multi-dose vial or the ampoule. The instructions in this package insert describe and illustrate injecting Fragmin using the prefilled syringe with safety needle device. The syringe with a passive safety needle device illustrated in this package insert is not the type of syringe that you should use to extract Fragmin from the single-dose vial, the multi-dose vial or ampoule.

FRAGMIN is available in ready to use, prefilled syringe with safety needle device.

PREFILLED SYRINGE WITH SAFETY DEVICE

Each syringe contains the required amount of FRAGMIN for one injection. Avoid pressing on the syringe plunger so as not to lose any of the syringe content.

INSTRUCTIONS FOR INJECTION AT HOME

IMPORTANT: REMOVAL OF INDIVIDUAL SYRINGE FROM BLISTER PACKAGING

DO NOT attempt to remove the syringe from the blister packaging with your fingers. Follow directions for correct handling technique as shown below when removing the prefilled syringe with safety needle device from the packaging, otherwise, the needle’s safety mechanism may be triggered, making the syringe unusable.

Please proceed as follows:

1. Peel off paper backing completely from the blister packaging.

2. Rotate the packaging so that the open side is facing downward between 3 to 5 cm above a flat surface, such as a table.

3. In order to release the syringe, pull the sides in the middle of the blister packaging apart to widen the blister cavity. This should cause the syringe to fall out of the blister.

4. Pick up the syringe by the body

DO NOT touch the needle guard activation clips at any time during use. This may trigger the needle's safety mechanism causing the needle to retract (pull back) before your injection is given. This will make the syringe unusable.

Proper subcutaneous (under the skin) injection of FRAGMIN is essential to help prevent pain and bruising at the injection site.

The preferred site of injection is the lower abdomen. However, FRAGMIN may also be injected into the side of the thigh, provided care is taken not to inject into the muscle tissue. Select a different site on the abdomen or thigh for each subsequent injection.
Prior to injection, wash your hands and cleanse the selected site for injection with an alcohol swab.

Remove the needle shield. Please note that a firm pull is needed to remove the needle shield. To ensure delivery of the full dose, do not remove any small air bubbles from the prefilled syringe before injection.

The needle must be inserted into a skin fold created with your thumb and forefinger. This fold of skin must be maintained throughout the injection.

Using your dominant hand, hold the syringe like a pencil between your thumb and middle finger. Insert the needle into the skin fold vertically, as far as it will go. Once the needle has been inserted, the needle should not be moved.

**If you are self-injecting**, press on the plunger using the forefinger. **If you are injecting someone else**, use the thumb to press on the plunger until the entire dose has been given. The needle guard will not be activated unless the entire dose has been administered and you remove downward pressure on the plunger. When you have injected all the content of the syringe, remove the needle.

Then, let go of the plunger and allow the syringe to move up inside the device until the entire needle is guarded.

Press a cotton swab on the injection site for 5-10 seconds. Do not rub the injection site.

Dispose of the used syringe/needle guard assembly in approved containers in a safe manner and ensure that it is kept out of the reach of children.

**Overdose:**

Accidental overdosage of FRAGMIN can result in very heavy bleeding.

In case of drug overdose, contact a health care practitioner, hospital emergency department or regional Poison Control Centre immediately, even if there are no symptoms.

Your doctor will arrange to have you admitted to the hospital for observation and treatment if necessary.

**Missed Dose:**

If you miss a dose, tell your doctor. Do not take two doses at the next dosage time.

**SIDE EFFECTS AND WHAT TO DO ABOUT THEM**

The most common side effects are pain and bruising at injection site. If the above symptoms become bothersome consult your doctor.

**SERIOUS SIDE EFFECTS, HOW OFTEN THEY HAPPEN AND WHAT TO DO ABOUT THEM**

<table>
<thead>
<tr>
<th>Symptom / Effect</th>
<th>Talk with your doctor or pharmacist</th>
<th>Stop taking drug and call your doctor or pharmacist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common</td>
<td><strong>Purplish or reddish discoloration</strong></td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>or pain, and bruising around the injection site</td>
<td>Y (if severe)</td>
</tr>
<tr>
<td></td>
<td><strong>Easy bruising or bruising without apparent cause</strong></td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>nosebleed</td>
<td>Y</td>
</tr>
<tr>
<td>Uncommon</td>
<td>Bleeding gums while brushing teeth</td>
<td>Y</td>
</tr>
</tbody>
</table>
### SERIOUS SIDE EFFECTS, HOW OFTEN THEY HAPPEN AND WHAT TO DO ABOUT THEM

<table>
<thead>
<tr>
<th>Symptom / Effect</th>
<th>Talk with your doctor or pharmacist</th>
<th>Stop taking drug and call your doctor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleeding at the injection site and/or from surgical site</td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Allergic reactions</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Bleeding inside the abdomen</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Bleeding from the mouth</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Bleeding from the anus</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Vaginal bleeding</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Blood in the urine</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Rare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strokes (bleeding inside the brain)</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

This is not a complete list of side effects. For any unexpected effects while taking FRAGMIN, contact your doctor or pharmacist immediately.

### HOW TO STORE IT

Store your prefilled syringes at room temperature (15-30°C).

### REPORTING SUSPECTED SIDE EFFECTS

You can report any suspected adverse reactions associated with the use of health products to the Canada Vigilance Program by one of the following 3 ways:

- Report online at www.healthcanada.gc.ca/medeffect
- Call toll-free at 1-866-234-2345
- Complete a Canada Vigilance Reporting Form and:
  - Fax toll-free to 1-866-678-6789, or
  - Mail to: Canada Vigilance Program Health Canada Postal Locator 0701D Ottawa, Ontario K1A 0K9

Postage paid labels, Canada Vigilance Reporting Form and the adverse reaction reporting guidelines are available on the MedEffect™ Canada Web site at www.healthcanada.gc.ca/medeffect.

**NOTE:** Should you require information related to the management of side effects, contact your health professional. The Canada Vigilance Program does not provide medical advice.

### MORE INFORMATION

This document plus the full Product Monograph, prepared for health professionals can be found at:
http://www.pfizer.ca

or by contacting the sponsor, Pfizer Canada Inc., at:
1-800-463-6001

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