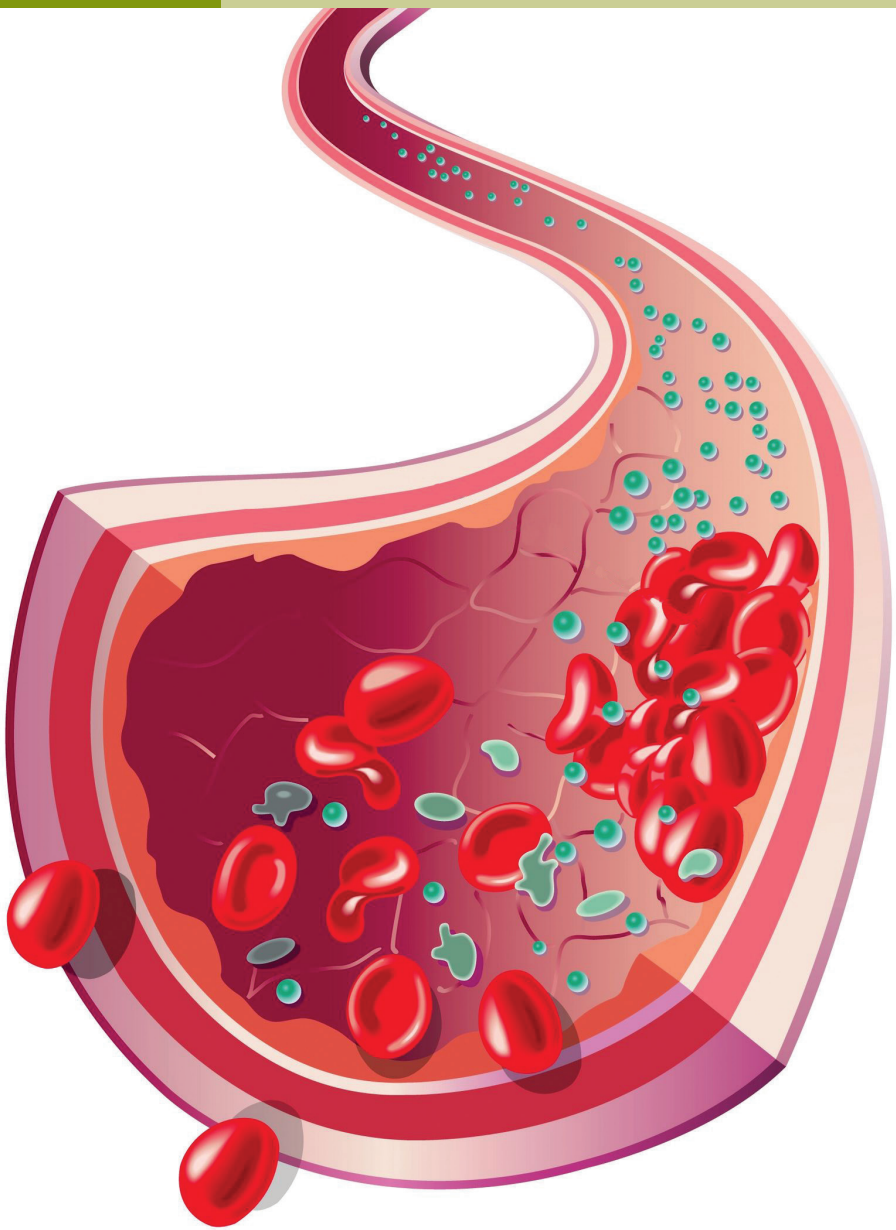
CHU Sainte-Justine
Le centre hospitalier universitaire mère-enfant

Université de Montréal

Thrombosis and anticoagulation

Booklet intended to a clientele with an anticoagulant treatment



This booklet is intended for a clientele that has been diagnosed with thrombosis and has begun anticoagulant therapy. The purpose of this booklet is to briefly explain what thrombosis is as well as its treatment, so that you will be better equipped throughout your treatment.

In order to lighten the text, we have chosen to make reference to the patient as a child even if the patient is an adult.

We are grateful for the generous support of TD Bank in the production of this booklet.

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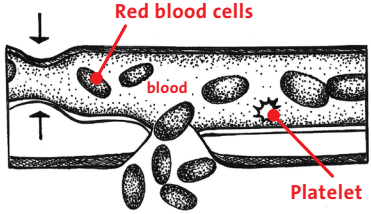
What is thrombosis?

First of all, it is important to know that blood is made up of red blood cells, white blood cells and platelets, among other things. As you will see below, platelets are the key components in thrombosis.

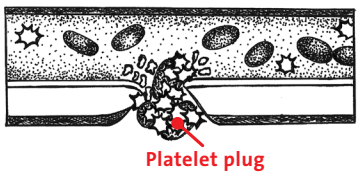
When a breakage takes place inside the wall of a blood vessel, the body begins a series of actions to repair and stop the bleeding. This breakage can be caused by an injury or may be the result of surgery or an invasive procedure (e.g.: a scraped knee due to a fall or the presence of a central catheter).

Here's an example to illustrate this concept: When we fall and scrape our knee, the platelets in our blood circulate towards the injury, where by sticking together, they work to close the wound and stop the bleeding. At the same time, the platelets attract numerous red and white blood cells circulating in the blood stream that come and stick to the injury to solidify and close the "hole". Once the bleeding has stopped, a blood clot that looks like a brown to almost black crust begins to form on the surface of the skin. Finally, fibrin (a molecule that looks like small fibrous chains) is formed through the blood clot to help keep it in place, until the wall of the blood vessel is repaired. Once the wound is healed, a pinkish scar will appear on the surface of the skin.

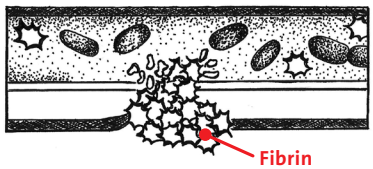
1. When a break in the blood vessel takes place, the platelets in our blood circulate towards the injury, where by sticking together, they work to close the wound and stop the bleeding.



2. Platelet plug formation



3. Platelet plug stabilization with fibrin



4. The blood vessel gets repaired and the platelet «plug» is eliminated. However, in the case of thrombosis, the «plug» stays there and can expand and block the blood's circulation, which can have negative effects on the limb or organ.

In some cases, the blood clot can form **inside** the blood vessel even when there is no breakage on the surface of the skin, using the same process as described above. This is referred to as thrombosis and the blood clot is called a thrombus. Depending on its size and the location where it is formed, it can obstruct the flow of blood or reduce it. A thrombus can form within the arteries (arterial thrombosis) or within the veins (deep vein thrombosis). It is also possible that the thrombus breaks loose from the wall of the blood vessel, circulates through the body, and then blocks blood flowing through a vessel in another part of the body. This is known as an embolism.

Understanding thrombosis

Venous Thrombosis

A venous thrombosis is a blood clot that forms in one or more of the veins in the body. The most common kind is called deep vein thrombosis (DVT) or phlebitis. It can be caused by an injury to the vein, a thickening of the blood, a decrease in the rate of blood flow or it can be formed suddenly. Deep vein thrombosis most often forms in the legs.

Signs and symptoms of the affected area can include:

- Sudden, intense and persistent pain
- Swelling
- Warmth in the skin
- Red or discolored skin
- Difficulty moving

It is possible that the thrombus formed inside the vein breaks loose and travels through the bloodstream to the lungs and blocks blood flow in the lungs. This is known as pulmonary embolism.

The following signs and symptoms may appear during a pulmonary embolism:

- Chest pain
- Shortness of breath
- Difficulty breathing
- Lightheadedness or dizziness
- Sudden and unexplained cough
- Coughing of blood

Arterial Thrombosis

An arterial thrombosis is a blood clot that forms in an artery due to a lesion or injury on the inner wall of the artery. A thrombus within the artery can obstruct the flow of blood through the circulatory system, or it can break loose and travel to another artery. A blockage of the coronary arteries (myocardial infarction) or arteries to the brain (Cerebrovascular Accident (CVA)) are some of the possible consequences of an arterial thrombosis.

Signs and symptoms in the affected area can include:

- Pain
- Pale skin
- Coldness
- Lack of movement
- Chest pain
- Paralysis
- Convulsions
- Problems with speech or speech impairment

Risk factors for venous and arterial thrombosis

A thrombosis can occur at any age. However, it is more frequent in adults than in children. Pediatric thrombosis is more common in newborns and adolescents than any other age group. A person who has one or more of the risk factors mentioned below is more susceptible to develop a thrombus. It is important to remember that having a greater risk does not necessarily mean that one will develop a thrombus. Consult your child's hematologist for more information.

Examples of risk factors:

- Presence of a central or peripheral catheter (e.g.: PICC (Peripherally Inserted Central Catheter), femoral catheter, Broviac, Port-A-Cath, Perm-Cath, etc.)
- Age: newborns and adolescents
- Obesity
- Active cancer under treatment
- Personal or family history of thromboembolic disease
- Presence of thrombophilia (disorder that predisposes to blood clots)
- Surgery with a risk factor for venous thromboembolism (e.g.: pelvic or femoral surgery, etc.) – Your physician will discuss with you concerning this possible complication before the surgery
- Oral contraceptives containing estrogen
- Smoking

- Chronic inflammatory disease (e.g.: Kawasaki disease, rheumatoid arthritis, systemic lupus erythematosus, antiphospholipid syndrome, Crohn's disease, ulcerative colitis, etc.)
- Severe infection
- Paralysis
- Prolonged immobility following a surgery, trauma or neurological condition
- Nephrotic syndrome
- Pregnancy and postpartum

The diagnosis of thrombosis

The signs and symptoms mentioned above indicate the possibility of a thrombosis. To make an accurate diagnosis, the physician will prescribe a Doppler ultrasound to find out if a thrombus is in fact present, if it is not located in the lungs. This is a non-invasive test and pain free that is done in the radiology department.

If the physician suspects that a thrombus is in the lungs (pulmonary embolism), he will prescribe a ventilation/perfusion scan,lwhich is performed in nuclear medicine. Alternatively, one can do an angioscan of the lungs as well. This exam is performed in radiology.

Available treatments

There are many treatments available for thrombosis; however, each case is unique. Your hematologist will decide the best treatment. In this guide, we will discuss treatments using subcutaneous (under the skin) heparin injections, such as low molecular weight heparin (enoxaparin : Lovenox™ or dalteparin: Fragmin™), as well as vitamin K antagonist (warfarin: Coumadin®).

Duration of treatment

Your hematologist will decide the duration of treatment based on your health condition and the evolution of your thrombosis. There are three different durations of treatment:

- Short term: Generally three to six months
- Medium term: Up to one year or until the disease is stabilized
- Long term: One year and more or in some cases, for life

During treatment, the navigator nurse in hematology will follow up closely with you and will schedule regular follow-ups with your hematologist.

For more information concerning the administration of an anticoagulant, please refer to *A Patient's Guide to Taking Warfarin* (p. 19) or *A Patient's Guide to Taking Enoxaparin* (see below).

A PATIENT'S GUIDE TO TAKING ENOXAPARIN (LOVENOX™)

Definition

Enoxaparin is an anticoagulant marketed under the trade name Lovenox™. It is used to prevent the formation of blood clots or to stop existing clots from growing. Enoxaparin does not completely prevent the formation of blood clots, but it reduces the risk quite significantly.

Blood tests

To ensure that your child is being prescribed the right dose of this medication, he will have to do regular blood tests at the hematology day centre. This analysis will determine concentration level of the medication in the blood, which generally must range between 0.5 and 1.0 U/ml. If this number is higher than 1.0 U/ml, it means that the quantity of medication being injected is too much. In this case, the hematologist will reduce the dose of enoxaparin. If the value is lower than 0.5 U/ml, it means that the quantity of medication is insufficient. The hematologist will then increase the dose of enoxaparin.

The blood test is done 4 to 6 hours following the last injection. Your child's navigator nurse will establish a schedule for the injections in order to facilitate blood test analysis and follow-ups. He or she will also advise you when the blood tests will take place.

Side effects

The most important and severe side effect of this medication is bleeding. Remember that the physician has prescribed this medication because the risk of developing blood clots without treatment is higher than the risk of bleeding with the treatment.

Possible minor side effects:

- Mild irritation or pain at the injection site
- Bruising (ecchymosis) at the injection site
- Swelling (induration) at the injection site

Preparation and administration of enoxaparin (Lovenox™)

General guidelines

Injecting enoxaparin can be stressful and may be an equal source of anxiety for you and your child. The navigator nurse in hematology is there to guide you and allow you to practice giving the injection properly. Below is a step by step explanation on how to prepare and inject enoxaparin. Each step is illustrated with a picture. Please refer to them as often as needed!

Storing of the medication

- Store the medicine at room temperature.
- Once the cap from the vial has been removed, the medication remains stable for up to 28 days.
- Once the heparin is in the syringe, it remains stable for up to 24 hours.

Material

- Enoxaparin vial or prefilled syringes.
- Plastic syringes of 30, 50, or 100 units with an orange cap.
- Two alcohol swabs.
- Cotton ball or a clean tissue.
- A sharps container for bio-hazard material (available at your pharmacy)

To begin :

- Choose a quiet place with adequate lighting.
- Gather your material.
- Place the material on a clean surface.

- Wash your hands by following the instructions below:
  - Remove all rings, bracelets and watch.
  - Wet your hands.
  - Wash your hands and wrists with soap and water.
  - Work up a good lather by rubbing your hands together thoroughly for 15 to 20 seconds. Make sure to wash your nails as well.
  - Rinse your hands under the running water.
  - Dry your hands with a clean cloth towel that is changed everyday, or use a paper towel.
  - Turn off the faucets using the cloth towel or paper towel

Preparation of enoxaparin

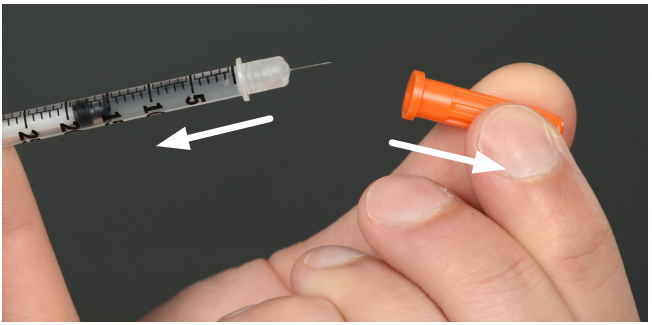
WARNING:

If you have prefilled syringes, go to the section administration of enoxaparin on page 15.

1. Check the expiry date of the medication as well as the content of the medicine vial. **DO NOT USE** the medicine and return it to the pharmacy if the fluid is dark, if it contains particles or if the product is outdated.
2. Remove the plastic cap from the medicine bottle and clean the rubber stopper on it with an alcohol swab. Rub the top with the alcohol swab for 15 seconds and let it air dry for another 15 seconds at least. Do not fan or blow on the plastic cap to avoid any contamination. **Do not touch the rubber stopper with your fingers. In case you do, repeat the disinfection process.**

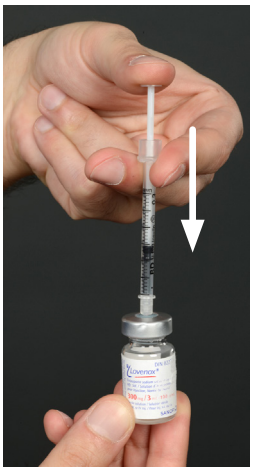
3. Pick up the syringe with the orange cap and pull back on the plunger to the amount ordered (for example, if the dose is for 8 mg, pull back on the plunger until you reach 8.)

4. Hold the syringe like you would hold a pencil, and remove the orange cap and place it on a clean surface.

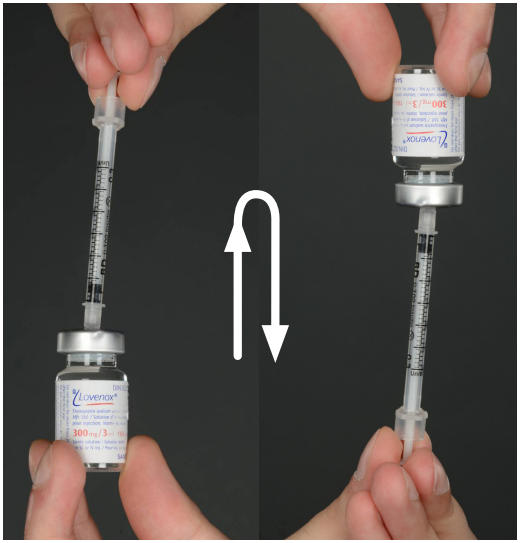


Make sure you do not prick yourself with the needle. Do not worry if you do. Simply use a new one and repeat this step.

5. Hold the medicine bottle and poke into the gray rubber. Push down on the plunger to inject the air in the syringe.

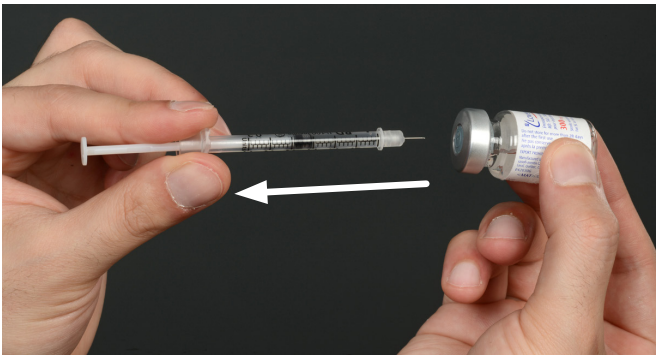
6. Hold the bottle in one hand and the syringe in the other hand. Carefully turn the bottle upside down.

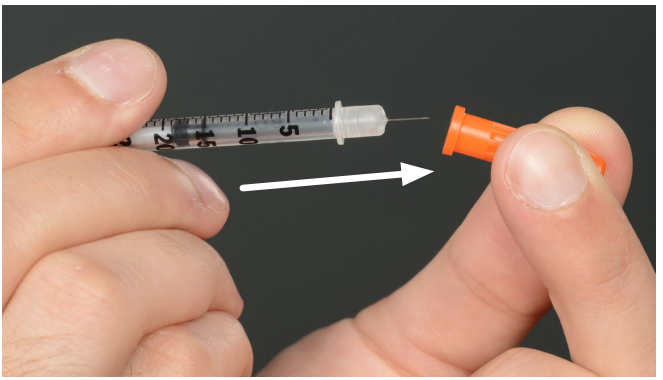


7. Slowly pull back on the plunger to the amount ordered. If air bubbles form in the syringe, push the plunger back to the bottle and restart this step. You can repeat this step as many times as needed to make sure there are no air bubbles left in the syringe.

   If ever you prick yourself with the needle, discard it and restart at step 3.

8. Remove the syringe from the bottle and put the cap back on. Be careful not to poke yourself with the needle!

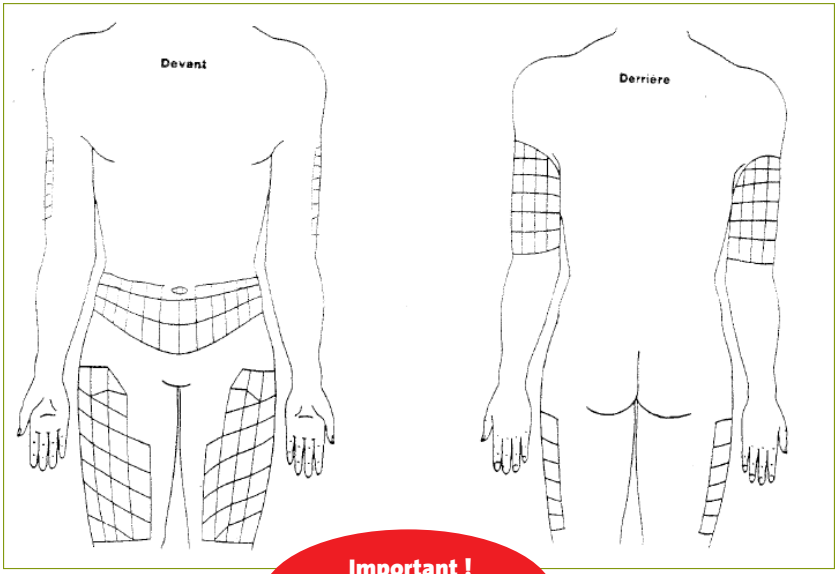




Administration of enoxaparin

This medication is administered by subcutaneous injection (layer of fat under the skin). The choice of injection site depends on the thickness of the subcutaneous tissue found on: the back of the arm, the front and side of the upper leg or the abdominal area (see drawing below). Your nurse will provide more information during the teaching sessions.

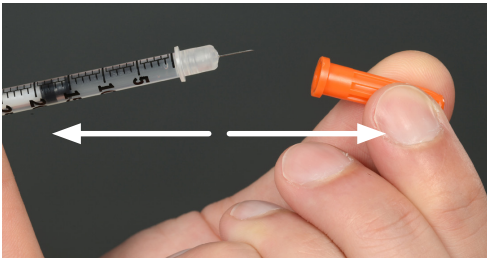
Injection sites



Important ! Never inject in the buttocks

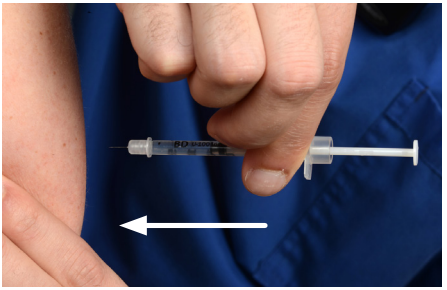
1. Disinfect the skin site with an alcohol swab by making spiral motions from the centre to the periphery. Let the alcohol dry for 30 seconds. DO NOT fan or blow on it to dry in order to avoid contamination.

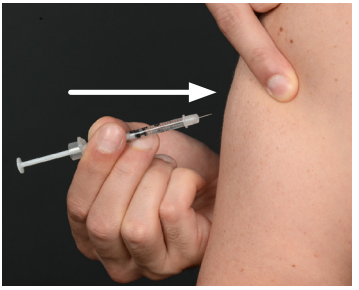
2. Meanwhile, remove the safety cap from the syringe and hold the syringe like you would hold a pencil. Use the same hand you use for writing.



3. Use the thumb and the forefinger of your other hand to gently pinch up the skin at the injection site.

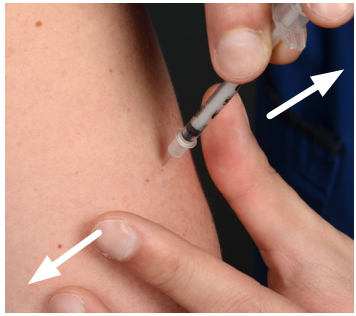
4. Hold the syringe firmly and put the needle into the skin fold at a 45º or 90º angle (your nurse will tell you the recommended angle for your child).





5. Inject the medicine slowly by pressing down on the plunger and by keeping the skin pinched between your thumb and forefinger during the entire time of the injection.

6. Once the full dose of medicine has been injected, release the skin fold and pull the needle straight out.



7. Quickly press a tissue or a cotton swab onto the site and apply pressure for 2 minutes **WITHOUT RUBBING** the skin in order to avoid bruising.

8. Put the used syringe and needle into a puncture proof biohazard container. DO NOT RECAP the needle.

Warning!

If an extra dose of enoxaparin has been administered by mistake, you must immediately contact your navigator nurse during opening hours of the hematology day center or the hematologist on-call after opening hours of the clinic. The contact information is on page 24.

Have you forgotten to administer a dose?

If you must administer the medication twice a day:

You must skip the missed dose if it has been more than 2 hours since the scheduled time for the injection. For example, if a dose was scheduled for 7:00 a.m. but you remember it only at 9:15 a.m. or later, do not administer the dose of enoxaparin. Simply administer the evening dose as scheduled and advise your navigator nurse of the situation.

If you administer the medication once a day:

You should call your navigator nurse as soon as you realize that you have forgotten to administer the dose. A decision will then be made with the hematologist to see if you should skip the dose. In certain situations, the hematologist can prescribe a smaller dose in the evening that day. Each case is unique.

If you are not sure, contact your navigator nurse and advise him or her of the situation. He/she will help you make the best decision.

A PATIENT'S GUIDE TO TAKING WARFARIN (COUMADIN®)

Definition

Warfarin is an anticoagulant that acts by interfering with vitamin K. It is normally used to prevent a thrombus (the formation of blood clots), stop the growth of an existing clot or prevent a clot from migrating elsewhere in the body.

Although they are called blood thinners, anticoagulants do not really thin the blood; it remains dark red. They simply decrease the ability of the blood to coagulate and form a thrombus.

How to take warfarin

Warfarin is available as a tablet that must be taken orally (by the mouth). It cannot be dissolved in water and it must not be chewed. Each different colored tablet corresponds to a dose (as indicated below). It is very important to take this medication at the same time each day, at dinner time.

Tablet strength	Tablet color
1 mg	Pink
2 mg	Lavender (light purple)
2.5 mg	Green
3 mg	Tan
4 mg	Blue
5 mg	Peach (light orange)
6 mg	Teal (blue-green)
7.5 mg	Yellow
10 mg	White

Blood tests

In order to ensure that your child receives the proper dose of warfarin, he will have to do regular blood tests known as prothrombin time or INR (International Normalized Ratio). Prothrombin time is a blood test that measures the time it takes for the blood to clot. Generally, patients taking warfarin must keep an INR range of 2.0 to 3.0. However, certain patients, such as some patients carrying a mechanical heart valve, must keep an INR range of 2.5 to 3.5. The proper range for your child will be determined by his hematologist who will take into account his health condition.

If your child has an INR lower than 2.0 or 2.5 for cardiac patients, this means that the clotting time is not sufficiently increased. Therefore, he has a higher risk for developing a blood clot. Inversely, if the INR is higher than 3.0 or 3.5, then the clotting time is increased too much. Therefore he has a higher risk for bleeding. For this reason, regular blood tests are done in order to keep a proper INR range. Your child's hematologist will determine the frequency of these tests. Your navigator nurse will communicate with you the test results and, if necessary, the changes that need to be made with his warfarin doses.

Side effects

Even in the absence of a trauma, the most common side effect of warfarin is bleeding. Despite proper doses and results that are within an adequate range, sudden bleeding can still occur. For more information, refer to the section When to consult a physician. Warfarin does not have many other frequent side effects.

In some very rare instances, a patient may develop an allergic reaction, have insomnia or start losing his hair. Discuss with your navigator nurse to have more information on this topic.

Instructions

It is important to:

- Take the medication every day at dinner time.
- Do the blood tests as suggested by your navigator nurse and your hematologist.
- Advise the dentist and all other health professionals that your child is taking warfarin.
- Use a soft-bristled toothbrush and floss gently to reduce the risk of bleeding of the gums (gingivorrhagia).
- Use a calendar to write down the doses of warfarin that your child needs to take daily, as well as the date for the next blood test.
- Use a weekly medication organiser to prepare the doses of warfarin in advance; these organisers are available at your local pharmacy. This will reduce any potential error.
- Consult a physician if you notice one or more of the symptoms mentioned in the section When to consult a physician (page 22)
- Contact your navigator nurse if your child:
  - Has had fever lasting more than 24 hours
  - Has diarrhea
  - Has nausea or vomiting
  - Shows any change in his health condition (e.g.: cold, flu or any other infection)
  - Begins a new medication (e.g.: antibiotics, etc.). In this case, the INR may change and the doses of wafarin may need to be readjusted.
  - Forgets to take a dose.

Things to avoid:

- DO NOT take an additional tablet the following day if you forget a dose. **Always take the same dose prescribed** by your hematologist.
- NEVER STOP taking warfarin without medical authorization.

- DO NOT participate in activities that may cause bleeding or injuries (e.g.: skiing, snowboarding, rides at La Ronde, "bungee", parachute, football, hockey, trampoline, etc.). Consult your navigator nurse or hematologist to see whether your child can participate in a sport or activity before registering him.
- Always talk to your pharmacist or hematologist before giving any other medication, including over-the-counter and natural health products.
- Do not make sudden changes to your child's diet or lifestyle.
- Avoid the consumption of alcohol.

LIVING WITH ANTICOAGULANTS (WARFARIN AND ENOXAPARIN): GENERAL GUIDELINES

Diet

There are no dietary restrictions. However, it is important not to make too many changes to your child's diet. This may cause changes in the results of the blood test, and consequently, his warfarin doses. Contact your navigator nurse for more information.

Exercise

Your child must avoid contact sports until the treatment is completed.

Physical exercise can resume only upon authorization by your hematologist.

Some activities may be restricted. Talk to your navigator nurse before registering your child for any physical activity.

Travel

Speak to your navigator nurse or hematologist before planning a trip. They will give you the necessary precautions and restrictions to respect, as well as offer you suggestions in order to avoid any complications during your travel. Your navigator nurse can also give you an official letter to help you clear the necessary materials needed for your child's treatment through customs.

Surgery

It is very important to advise your surgeon that your child is taking anticoagulants. Make sure to also advise your child's hematologist of any surgical procedure he may have to undergo. In this case, the hematologist will issue the surgeon certain recommendations and will establish a schedule to interrupt and to resume the anticoagulant therapy.

Dentist

For any necessary dental procedure, such as routine cleaning, repairing tooth decays, or a procedure requiring anesthesia, **you must absolutely advise your dentist that your child is taking anticoagulants.** You must always advise your child's navigator nurse of the dental procedure in question.

The risks of bleeding during invasive procedures, such as removal of a tooth or local anesthesia, are much higher for people taking anticoagulants. To avoid any complications due to bleeding, your child's navigator nurse, along with the hematologist, will go over the procedure with the dentist. They will then give you the proper guidelines to follow.

Restrictions

To avoid any risk of bleeding, your child must avoid amusement parks such as La Ronde and the water slides until the treatment is completed. Diving and jumping on a trampoline are also prohibited.

WHEN TO CONSULT A PHYSICIAN

- Below is a list of all the symptoms you must pay attention to. If you experience one or more of these symptoms, please advise your navigator nurse:
  - Sudden bruising on the body (ecchymosis)
  - Blue bumps on the body (hematoma)
  - Prolonged bleeding of the gums (gingivorrhagia)
  - Nosebleeds (epistaxis)
  - Increased menstrual flow (menorrhagia) (ex: twice as heavy than usual)

- Immediately go to the nearest hospital or to the CHU Sainte-Justine emergency if you experience one of more of these symptoms:
  - Fall on the head or any head trauma
  - Prolonged bleeding from cuts or injuries
  - Blood in urine (hematuria)
  - Blood in stools or black, tarry stools
  - Prolonged or severe headache
  - Dizziness without cause
  - Difficulty breathing or sudden shortness of breath
  - Chest pain
  - Sudden and severe abdominal pain
  - Persistent abdominal pain after being hit in the stomach
  - Sudden or increasing pain at the site of the thrombosis

- Discoloration or coldness of a limb (ex: arm, leg)
- Sudden intense coughing and without cause
- Coughing up blood (bloody expectoration)
- Vomiting of blood or material that looks like coffee grounds (blood clots)
- Sudden, persistent and intense back pain
- Swelling of the joints (ex: swelling of the knees, elbows, wrists, etc.)
- Vision problems (ex: blurry or double vision, etc.)
- Convulsions (ex : repetitive and uncontrollable movements)
- Change in consciousness
- Change in speech (ex : sudden stuttering, sudden use of improper words while talking)
- Confusion
- Paralysis of one or more limbs.
- Sudden difficulty of walking or standing
- Sudden change in the overall state of health, (ex: unexplained extreme fatigue)

To contact us

For any questions or more information regarding your child's anticoagulation treatment, you can contact the navigator nurse by dialing the number below, Mondays to Fridays from 8:30 a.m. until 4:00 p.m.

Phone : 514-345-4931, Ext. 2713

Fax : 514-345-2340

For assistance in the evenings, weekends or holidays, you can reach the assistant head nurse at the hematology ward at:

514-345-4931, Ext. 2111

Opening hours for the hematology-oncology day center at the CHU Sainte-Justine are Mondays to Fridays from 8:30 a.m. until 4:00 p.m.

For emergencies:

They are admitted at the hematology-oncology day center from 8:30 a.m. until 3:30 p.m , except on Wednesdays from 8:30 a.m. until 11:00 a.m. Outside of these hours and during holidays, you must go to the CHU Sainte-Justine emergency department, or to your local hospital center.

INR results and warfarin doses

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
INR : ________ Dose : ______	INR : ________ Dose : ______	INR : ________ Dose : ______	INR : ________ Dose : ______	INR : ________ Dose : ______	INR : ________ Dose : ______	INR : ________ Dose : ______
INR : ________ Dose : ______	INR : ________ Dose : ______	INR : ________ Dose : _______	INR : ________ Dose : _______	INR : ________ Dose : _______	INR : ________ Dose : _______	INR : _______ Dose : _______
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Notes

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