



Coping with Naxitamab, an Anti-GD2 Monoclonal Antibody

Naxitamab is FDA-approved and is now being administered at other institutions in addition to Memorial Sloan-Kettering Cancer Center (MSKCC). Factual information about the purpose and scientific aspects of this treatment, and its role in various frontline, refractory, or relapse treatments, will be discussed elsewhere in this Handbook. The focus of this section is *coping with the side effects*.

How is Naxitamab administered and how long does it take?

Generally, one cycle of naxitamab consists of 3 doses, given on a Monday, Wednesday, and Friday schedule, but the specific days may be adjusted. It is given in the outpatient setting. The actual administration time of the treatment can be anywhere from 30-60 minutes. Additionally, the child will receive premedications, which take about 1 hour. Patients are observed for a minimum of 1 -2 hours after the infusion is complete. Children often sleep for a few hours after treatment, so a child could be in the clinic anywhere from 3 to 6 hours.

Sargramostim is an injected medication that is often given with naxitamab. Central lines are accessed, labs may be drawn, vital signs are taken, and it will be determined if the child is cleared to receive naxitamab. Once cleared, premedications will begin. This includes medications to minimize/prevent possible side effects including nausea, vomiting, signs and symptoms of allergic reaction, fever, and pain. The treating RN will usually ask your child to use the restroom before the pre-meds are administered, as some children feel a strong urge to urinate or have a bowel movement during Naxitamab treatment. The treating RN will let you know when the naxitamab infusion is starting.

At some point during the infusion the child will likely begin to experience pain and/or other possible side effects (see discussion below). The infusion may be paused, or the rate of the infusion slowed down to help better manage side effects. The infusion of naxitamab is followed by a normal saline flush. When the infusion and flush are finished, the treatment itself is complete. Patients may sleep for a while after treatment as a result of the pain and allergy medications received. During the rest time after treatment, nurses continue to monitor the child for any adverse or late effects of the treatment. Patients are not released until the medical staff is satisfied that they no longer need medical supervision.

What are the side effects of Naxitamab?

The side effects of naxitamab generally occur during or after treatment and are for the most part, limited to the week of treatment. The common side effects are described below.

Pain

The most common side effect of naxitamab is pain, which is controlled with pain medication and non-pharmacologic pain management strategies such as meditation, distraction, dance therapy, etc. The pain occurs because naxitamab attaches to the GD2 antigen found on the surface of neuroblastoma cells. However, the GD2 antigen is also found on normal nerve cells. When the antibody attaches to the GD2 antigen on a nerve cell, a message is sent to the brain, and the patient feels pain.

The pain may vary in intensity and range from mild to severe, with the more intense pain usually

occurring during the infusion itself. It also may vary from treatment day to treatment day. Witnessing a child in pain can be extremely difficult for parents. It may be difficult to manage the child's pain as effectively during the first naxitamab infusion as everyone is learning—the child, medical and nursing staff, and parents—how the child will react to the treatment and well as the medications used to treat the side effects seen. Usually for subsequent doses, the staff has a better understanding of how best to manage side effects seen in a child. Each family will learn, usually through trial and error, which non-pharmacologic techniques work best for their child. For example, some find applying ice packs helps with the pain, while other children prefer heat packs. Some children will use both ice and heat at different stages of the treatment. Some children may prefer to be rocked in a rhythmic fashion, have music or a video playing, request massages, while others may not want to be touched. Learning your child's preferences often helps them cope with the treatment.

Children may also experience residual pain after the infusion is completed and possibly even after leaving the clinic. Parents are sent home with instructions on how to possible residual pain, should it occur, after leaving the clinic.

Allergic Reactions

The second most common side effects are allergic reactions, usually hives, redness, or swelling, with or without itching. This side effect is usually controlled with the administration of antihistamines such as Benadryl (diphenhydramine) or Vistaril (hydroxyzine). Sometimes, hives or swelling occurs in the mouth or throat and may cause breathing difficulties. All children receiving naxitamab wear a pulse-oximeter to measure oxygen levels. If a child's oxygen level drops, oxygen is on hand to be administered if needed. Additionally, children may receive a nebulizer with medication to help treat the throat swelling or difficulty breathing. Although rare, a life-threatening allergic reaction may occur and may be treated with epinephrine injected into the muscle, often referred to as an Epi-pen.

Low Blood Pressure

Children receiving naxitamab may experience a drop in their normal blood pressure during the infusion. The drop in blood pressure is usually treated with an infusion of intravenous (IV) fluids. This IV fluid may be administered using an IV pump or pushed into the child's central line or peripheral IV using a syringe for faster administration. The naxitamab infusion may be paused while efforts are made to increase the child's blood pressure. When the infusion is restarted, it may be started at a slower rate.

High Blood Pressure

Children can also experience high blood pressure during and occasionally, after the naxitamab infusion. The high blood pressure may be a result of pain and resolve when the pain is treated. Although rare, if the high blood pressure persists, the team may start medication to treat the high blood pressure and may perform additional testing. Blood pressure is monitored periodically during and after the naxitamab infusion, as well as in the days after the cycle is completed.

Fever, Vomiting, Intestinal Distress

Patients may experience other symptoms such as fever, vomiting, diarrhea, or constipation to varying degrees during treatment. Fever can be concerning if the patient has a central line, as it can be difficult to determine if the fever is treatment related, or a result of an infection. Blood cultures may be drawn, antibiotics given, and parents may need to watch the child closely after treatment and notify the clinic if fever returns.

Children may experience nausea and/or vomiting, but it is generally controlled with premedication of anti-nausea medication. Avoiding a big meal prior to the start of treatment can help prevent vomiting during the infusion. Some children experience diarrhea or may have the sensation of needing to have a bowel movement during the infusion. To maintain safety, children are not able to walk to the bathroom during the infusion or get on a bedside toilet such as a commode, but can use a bedpan, diaper, or bedpads. If diarrhea occurs, it generally resolves after treatment. Other children

may have constipation, likely a side effect of the pain medication.

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