



Common Support Medications and Interventions During Chemotherapy

This information along with other educational material is available on our website at www.WatsonClinic.com/Cardosi

Chemotherapy has many effects on your body—on both the good cells and the cancer cells. You have likely already read all about the side effects that you may experience as a consequence of your specific chemotherapy drug(s) (separate handout available for each specific chemotherapy medication). In general, these effects may be:

- ❖ temporary and short lived (recovery prior to next treatment cycle) such as is the case with bone marrow suppression (decreased blood counts), nausea/vomiting, and gastrointestinal side effects
- ❖ temporary but longer lasting (recovery is usual but not until all treatments are completed) such as is the case with hair loss, fatigue, skin changes, and some nerve damage
- ❖ potentially permanent (never returns to normal pre-chemotherapy status) such as is the case with other variants of nerve damage among other rare side effects

Under typical circumstances, your normal cells that are damaged by chemotherapy have the capacity to repair some or all of the chemotherapy related damage. The side effects you suffer from chemotherapy are related to the damage caused to the normal cells before they have a chance to repair themselves. Sometimes however, it is necessary for you to take additional action to assist your body in overcoming the side effects of chemotherapy. This handout is designed to review some of the support medications and interventions that may be needed during or following treatment to minimize the toxicity you experience from chemotherapy. These range from injections to help your blood counts, mouth wash to ease the discomfort of mouth sores (mucositis), blood transfusion to overcome anemia (low red blood cell count), to medications to make nerve damage less cumbersome and/or painful.

Support medications and other interventions that may be needed are reviewed below. There are a lot of terms used in this handout with which you may not be familiar. We have tried to define all of these words for your convenience, but please read slowly and several times if needed; and of course, do not hesitate to ask questions at the office. It is our sincere desire for you to understand your treatment, its potential side effects, and the best management of those side effects.

GROWTH FACTORS

These medications may be used to help your blood counts recover to acceptable levels so that your next cycle of chemotherapy can be safely given. These drugs can also be used to prevent your blood counts from falling too low where your risk of associated complications (infection, bleeding, etc.) may be higher than is desired. Obviously not all patients and not all chemotherapy regimens require use of these medications. In the treatment of most gynecologic cancers, these medicines are not typically used until it becomes apparent that you truly need such; that is, not until after you have demonstrated a problem with recovery of your blood counts. All of these medications are given as injections and are not available as pills.

White Blood Cell Growth Factors

Granulocyte Colony Stimulating Factor (G-CSF), also known as filgrastin (brand name Neupogen) is given to increase your white blood cell count. Recall that chemotherapy can affect your bone marrow and decrease the number of white blood cells available to fight infection. G-CSF stimulates the bone marrow to produce more white blood cells, specifically granulocytes (also called neutrophils). This extra bone marrow stimulation is aimed at keeping your white blood cell count from getting too low and helping it recover to a normal level by the time your next treatment is due. This extra bone marrow stimulation also sometimes results in bone pain as a side effect of this medicine.

G-CSF (Neupogen) is typically given as a subcutaneous injection (injection under your skin) on a daily basis until your white blood cell count recovers beyond its lowest point (the lowest point is called a *nadir* and typically does not occur for 7-10 days following most chemotherapy treatments). This means that you will receive injections for approximately 10 consecutive days. The injections do not start until 24 hours after your chemotherapy infusion is completed.

Most often, these injections are administered at the infusion center in the Center for Cancer Care & Research (white building across parking lot from our office). G-CSF can also be self-administered at home if you are comfortable giving yourself injections or if there is someone else capable and comfortable giving the injection to you. The infusion center nursing staff will gladly educate you or your family in this process if interested. You must keep in mind that if you self-administer your G-CSF, it will be necessary for you to obtain the medicine at your local pharmacy after receiving a prescription from your doctor. This may drastically affect your financial responsibility with regards to payment for the medication (it is extremely expensive!), but the specifics of such will depend on your insurance plan's prescription drug coverage.

Pegylated G-CSF, also known as pegfilgrastin (brand name Neulasta), is similar to G-CSF (filgrastin, Neupogen) in both action and side effects but only requires dosing once per chemotherapy cycle. This means you require only one injection per cycle instead of 10 injections. This is obviously desirable from an injection standpoint, but it must also be recalled that side effects will be present until the medicine "wears off"—3 to 4 weeks later. Like Neupogen, Neulasta is not given until 24 hours after your chemotherapy infusion, and recommendations are also to not give this medication within 14 days of your next treatment. This latter stipulation makes this drug difficult to use with weekly or bi-weekly chemotherapy regimens.

Pegylated G-CSF, (Neulasta) is also given subcutaneously (injection under your skin) at our infusion center or can be self-administered. This medication is extremely expensive and only certain insurance carriers provide adequate reimbursement to allow our infusion center to cover the cost of the drug, let alone cover any related administration, staffing, and inventory expenses. We will certainly offer this drug to you if potentially beneficial, but if your insurance does not provide adequate reimbursement, it will only be available as a prescription and must then be self-administered. Besides the convenience of a single injection, Pegylated G-CSF offers no clinical advantage over G-CSF.

Platelet Growth Factors

Interleukin-11, also known as oprelvekin (brand name Neumega), is a *cytokine* (a chemical similar to a hormone that allows cells to communicate with one another) that causes the bone marrow to produce more platelets (the component of blood important for forming clots to help stop bleeding). Too low of a platelet count increases your risk of bleeding. Oprelvekin reduces the length of time that your platelet count is low following chemotherapy. This medication is given by subcutaneous injection (injection under your skin) at our infusion center or it may be self-administered after obtaining the drug from your local pharmacy with a prescription. Oprelvekin is typically given for about a 10 day course (until your *post-nadir* platelet count is greater than 50 thousand).

Oprelvekin is rarely required in gynecologic oncology, which is fortunate as it has several potential side effects including: rapid heart rate (palpitations), water retention in hands and legs (peripheral edema), anemia (decreased level of red blood cells), and it may have harmful effects on fertility and/or an unborn child.

Red Blood Cell Growth Factors

Epoetin (Procrit, Epogen, EPO) and **darbepoetin** (Aranesp) are both used to fight anemia (red blood cell count being too low). These medications are used to prevent or limit red blood cell transfusions. It has also been shown that correction of anemia improves quality of life while receiving chemotherapy. Both medications are given subcutaneously (injection under your skin) at our infusion center or can be self-administered at home. Again, self-administration will require you to obtain the drug from your local pharmacy with a prescription from the doctor. Both of these medications are typically given on a weekly, bi-weekly, or occasionally tri-weekly basis.

Recent studies have suggested that in some circumstances these drugs can be associated with very serious side effects including: heart attack, stroke, blood clots in the legs or the lungs (*thromboembolism*), and possibly progression of cancer. The studies that identified these potential side effects were not specifically designed to investigate such side effects, included relatively few ovarian and/or uterine cancer patients, were using the drug in conjunction with radiation, or were aiming to achieve higher than recommended hemoglobin levels (level of the protein inside the red blood cells responsible for carrying oxygen). Therefore, these were not perfect studies from a scientific standpoint, but these reports led the United States Food and Drug Administration (FDA) to publish strict guidelines regarding the use of these drugs, and the FDA also required the drug manufacturers to make label changes addressing these potential side effects.

These changes have led to a substantial decrease in our use of these drugs. Having said that, there are circumstances where we find these drugs to be both safe and helpful. We will recommend these medications as appropriate and will gladly review the above data in more detail if desired. You can also review the FDA opinion at www.fda.gov. The alternative to receiving these medications is to receive a blood transfusion.

BLOOD TRANSFUSION

Patients require blood transfusion for many reasons. We will be focusing on reasons related to chemotherapy side effects in this handout. Blood is made up of many components, which when separated are referred to as blood products. Most often, patients need red blood cells, platelets, or plasma. Other blood products exist but are beyond the scope of this handout. Your doctor will determine which product(s) you need based on your lab tests and your symptoms.

Blood products come from blood donated by volunteers. There is no replacement for blood, and there is no man-made or synthetic type of blood. Donors are carefully screened and tested, and their blood is subsequently tested as well to be sure it is safe. The blood is then separated into the various products. This separation into products allows one person's blood to help many people.

In the setting of cancer treatment, you will not be able to donate blood for your own use later. This is because we cannot allow enough time for blood counts to recover to normal prior to beginning chemotherapy or radiation or prior to any needed surgery. In certain cases it is acceptable for your family or friends to donate blood specifically for your use (this is called *directed donation*). Directed donation is not helpful in urgent or emergency cases, and there is no evidence to suggest that it is any safer than the general blood supply. If directed donation is something you may be interested in, you should contact our local blood bank to receive further instructions.

Each blood product has a specific job. Red cells carry oxygen throughout the body. Your red blood cell count is typically measured by a hemoglobin value (*hemoglobin* is the protein inside the red blood cell that carries the oxygen). When your hemoglobin is low (anemia), you feel tired or can become short of breath with minimal activity, and a red blood cell transfusion can correct this.

Plasma and platelets each work to help stop bleeding following an injury. If your platelet count is low, you may bleed or bruise more easily or take longer to stop bleeding after minimal injury, and a platelet transfusion can minimize this risk. Plasma is most often used when other blood proteins needed for clotting have been depleted by other medications (for example warfarin) and urgent or emergent correction is needed.

Once it is determined that you need a blood or blood product transfusion, we will make arrangements for such to be given at the hospital. This can often be done without an overnight stay, but depending on the blood product needed and the amount required, an overnight stay may be necessary.

When receiving a blood transfusion, there is a risk of having a reaction to the blood. This may be minor such as a *febrile reaction* (most common) or major such as a *hemolytic reaction*. These reactions are due to your body seeing the blood as "foreign" and trying to fight it off as it does an infection. Very specific blood type matching minimizes the risk of reaction, but reactions still occasionally occur. Both febrile and hemolytic reactions have similar symptoms and include fever, low back pain, nausea, and/or rash. If a reaction occurs, the transfusion is stopped and returned to the blood bank for investigation. If you have ever had a transfusion reaction, you should be sure your doctor is aware so that additional steps can be taken to minimize your risk of a repeat reaction with subsequent transfusion.

Infections can also be transmitted in transfused blood. The risk of acquiring human immunodeficiency virus (HIV) from a blood transfusion is 1 in 2 million, Hepatitis B risk is 1 in 200 thousand, and Hepatitis C risk is 1 in 2 million. These risks are quite low today because of sophisticated testing done on each volunteer blood donor and on each donated unit of blood. The risk of acquiring a bacterial infection (1 in 1 million) is also quite low due to the sterile system in which blood is processed.

MISCELLANEOUS/OTHER

"Magic Mouth Wash" is a special mixture of substances used to treat mouth ulcers/sores (mucositis) as a result of chemotherapy. There are various formulations used, but we most often mix equal parts of liquid diphenhydramine (Benadryl), viscous lidocaine (Xylocaine), aluminum and magnesium hydroxide (Maalox), and liquid nystatin (an anti-yeast medicine). When prescribed, a teaspoon of this solution should be swished around in your mouth and then either spit out or swallowed 4 times daily. If your mouth develops sores or ulcers, then other parts of your gastrointestinal tract (for example, your esophagus) may have them as well, and thus swallowing the solution may be beneficial. Swallowing the solution may cause some nausea, however.

A warm salt or soda water solution may also prove beneficial if you are suffering from oral mucositis, and good oral hygiene is an important preventive measure. The salt and soda water solutions are made by mixing ½ teaspoon of either salt or soda with 8 ounces of water. This solution is swished/gargled and spit out or swallowed 4 times daily.

Neuropathy Treatment — Nerve damage may result from chemotherapy. If this affects the ears, a ringing or buzzing (tinnitus) may develop. When this occurs, hearing tests are typically recommended with our audiology specialist. These specialists can also give some advice on how to "ignore" or "tune out" the ringing or buzzing sounds. Nerve damage may also affect your hands and/or feet. This is sometimes quite mild, and no treatment is required. At other times, this can be very painful and interfere with even simple daily activities such as buttoning clothes or clasping jewelry. If significant symptoms develop, a change in chemotherapy drug or drug dosing may be required. There are also some medicines that can be taken to help with symptom management. These medications include amitriptyline (Elavil), gabapentin (Neurontin), and pregabalin (Lyrica). Your doctor will discuss the most appropriate medicine for you and your circumstances. They all can cause some fatigue and are therefore often started at low doses with slow dose increases as tolerated. They all also require several weeks before any meaningful benefit is observed. Other forms of nerve damage may occur but are quite rare and will be individually and specifically reviewed by your doctor as appropriate.

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1755 N. Florida Avenue ♦ Lakeland, Florida 33805 ♦ 863-680-7578 ♦ Fax: 863-616-2415 ♦ www.WatsonClinic.com/Cardosi