



American
Brain Tumor
Association®

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Bevacizumab (Avastin)

If you have been diagnosed with a recurrent malignant glioma, your doctor may suggest treatment with a drug called bevacizumab, also known as Avastin. Bevacizumab belongs to a class of drugs called [monoclonal antibodies](#) which are drugs designed to work with proteins found on the surface of tumor cells.

Bevacizumab shrinks tumors by stopping the formation of new blood vessels that feed tumors and supply them with oxygen, a process known as angiogenesis. It does this by blocking the action of a protein called vascular endothelial growth factor (VEGF). Because VEGF is thought to play an important role in the formation of the new blood vessels surrounding tumors, blocking VEGF may help stop or control tumor growth.

Bevacizumab is the generic name for the drug, and Avastin is its brand name in the United States. Avastin is approved by the U.S. Food and Drug Administration (FDA) to treat patients with certain types of colorectal and lung cancers. It is currently FDA approved for the treatment of glioblastoma that recur after treatment (Glioblastoma is a high-grade, malignant brain tumor.). However, it may be used in the off-label setting if your physician prescribes this treatment. “Off-label” means the use of an approved treatment for any purpose other than that described in the treatment’s FDA-approved labeling.

Bevacizumab appears to increase the duration of time until tumor regrowth in people with recurrent glioblastoma. For some people, this effect can be very dramatic. In one study, 36 percent of patients with recurrent glioblastoma who received bevacizumab alone, and 51 percent of those treated with bevacizumab and chemotherapy, survived without tumor growth for at least six months. Why some people respond well to this drug, and why some people do not respond at all, is the topic of several research studies. Scientists theorize that patients whose tumors have thinner blood vessels, or who have particular bio-proteins present in the tumor, may show greater response to bevacizumab, however, ways to pre-determine these conditions are still under investigation.

Research into how bevacizumab can best be used to treat brain tumors continues. Some treatment plans use bevacizumab alone; other treatments combine bevacizumab with chemotherapy drugs and/or radiation in an effort to increase the effectiveness of each. Researchers do not yet know if it is safe to use bevacizumab in children.

How is Bevacizumab given?

Bevacizumab is given through an IV (into the vein) injection every 14 or 21 days, depending on the prescribed treatment plan. The first infusion of the drug may take longer than the follow-up treatments (e.g., 90 minutes). If there are no side-effects during or following the initial dose,

followup infusions are sometimes given more rapidly than the first infusion. Your nurse will tell you if they plan to change your infusion time from 90 minutes to 60 or 30 minutes.

What are the possible side effects of using bevacizumab to treat a brain tumor?

Bevacizumab can be prescribed alone or along with a chemotherapy drug. Organized research studies, called clinical trials, are being conducted to learn the effects of bevacizumab alone and in combination with various chemotherapy drugs.

The side effects differ for each use. The most common side effects of bevacizumab when used alone (when not given in combination with a chemotherapy) are delayed wound healing, high blood pressure, nosebleeds, excessive protein in the urine, fatigue and headache.

Patients who receive bevacizumab alone or in combination with a chemotherapeutic drug have shown significant reductions in MRI contrast enhancement that are often related to improvements in progression-free survival. These improvements however, might only represent the reduced vascular permeability caused by bevacizumab rather than an antitumor effect. The combination of these MRI scans with another type of MRI scan called fluid-attenuated inverse recovery (FLAIR) scan may provide more insights into the tumor response. In addition, advanced imaging modalities such as magnetic resonance spectroscopy (MRS), diffusion-weighted MRI (DWI) and ¹⁸F-fluoromisonidazole PET may provide useful information in differentiating the treatment effects from tumor recurrence.

When bevacizumab is given in combination with another traditional chemotherapy drug symptoms may be related to whichever chemotherapy drug is being used. Symptoms such as decreased immune function, anemia (low red blood cells), low platelet count, weakness, fatigue, stomach pain, nausea and vomiting, loss of appetite, upper respiratory infection (nose, sinuses, and/or throat), diarrhea, constipation, hair loss, and mouth sores may occur. Bevacizumab may cause the effects of chemotherapy on blood and bone marrow to be more severe than if the chemotherapy were given alone. Other, less common side effects may include dizziness, shortness of breath and muscle pain. These effects are most likely related to the combination of chemotherapy drug and bevacizumab, and not to the bevacizumab alone.

Among the rare but serious potential side effects associated with bevacizumab treatment when used in any setting include:

- Perforations (holes) in the gastrointestinal tract,
- Hemorrhage (sudden bleeding) at the site of the tumor,
- Tracheoesophageal fistulas (holes in the esophagus),
- Nephrotic syndrome (kidney damage),
- Severe increase in blood pressure possibly leading to a stroke, and/or
- Heart failure.

Lastly, all brain tumor patients have an increased risk of developing a blood clot in the blood vessels of their legs (a deep vein thrombosis) or in their lungs (a pulmonary embolism). Bevacizumab treatment may increase this risk.

Are there ways to lessen some of the bevacizumab side effects?

To reduce the risk of treatment side effects, be sure to tell your doctor or nurse all medications/supplements you are taking, including any prescription and non-prescription drugs,

vitamins, and/or herbal supplements. In addition, prior to receiving treatment, tell your providers if you have ever had:

- High blood pressure
- Ulcers, diverticulitis, or any type of fistula
- Heart problems, including heart attack or congestive heart failure
- Blood disorders, including bleeding or clotting problems
- Liver or kidney problems
- a history of serious non-healing wounds or broken bones;
- if you have had any type of minor or major surgical procedures in the past month; or
- if you are planning to have surgery (including dental work).

Most treatment side effects are manageable and do not necessarily indicate that you will need to stop the drug. For example, most patients will develop high blood pressure at some time during their treatment with bevacizumab. If you are diagnosed with high blood pressure while receiving treatment with bevacizumab, your doctor may prescribe medication to treat the high blood pressure.

Please report any concerns or changes in your medical health to your nurse or doctor. Completing all your lab work as scheduled, including blood and urine tests, is also a good step toward managing the treatment side effects.

What are the precautions before using bevacizumab?

Bevacizumab should be used with caution in patients who are known to be allergic to bevacizumab (for example, if you've had prior treatment with the drug and experienced a reaction) or any bevacizumab-containing drugs. Because the infusion of bevacizumab may cause side effects needing immediate attention, patients should receive treatment in a hospital, physician's office or outpatient/oncology clinic.

Prevention is the best cure. Making informed decisions about the safety of using bevacizumab in your individual case is the responsibility of you and your physician.

If bevacizumab is given alone, most patients will not require "premedication" with nausea-prevention or other drugs. However, when bevacizumab is given in combination with a chemotherapy drug on the same day, patients may benefit from "anti-nausea premedication" depending on their treatment plan.

Bevacizumab is known to cause birth defects or spontaneous abortion if used during pregnancy. Inform your doctor if you are pregnant, believe you may be pregnant, if you are breastfeeding, or if you are planning to have children in the future (both males and females). Couples should use a reliable form of birth control (e.g. birth control pills and/or a condom with every encounter).

Are there any financial concerns I should think about in advance of starting bevacizumab treatment?

Any medication prescribed in the off-label setting is subject to review by your health insurance company. Since bevacizumab is currently FDA-approved to treat colorectal cancer, non-small cell lung cancer, and recurrent/progressive glioblastoma, your insurance company may deny the pre-authorization request for some situations in brain tumor treatment. Or, they may deny reimbursement for the drug and the medical services necessary to give the treatment.

Bevacizumab is expensive and many insurance companies will want to see clinical trial proof that the drug will likely benefit you before they authorize payment for this treatment. Ask your doctor or nurse if they can help you with this. The manufacturer, Genentech Pharmaceuticals, also offers a website with information related to Avastin. Visit <http://www.gene.com/gene/products/information/oncology/avastin/> and at <http://www.avastin.com/patient/index.html> for more information.

In addition, the American Brain Tumor Association provides consultations to patients and families. Please feel free to contact us at 800-886-ABTA (2282), ask to speak with a patient services representative.

Where can I get more information about bevacizumab?

Medline Plus (the National Library of Medicine/National Institutes of Health) has information available by visiting: <http://www.nlm.nih.gov/medlineplus/druginfo/medmaster/a607001.html>.

This information is not intended as a substitute for professional medical advice and does not provide advice on treatments or conditions for individual patients. All health and treatment decisions must be made in consultation with your physician(s), utilizing your specific medical information.