Angiogenesis and Angiogenesis Inhibitors to Treat Cancer

Angiogenesis is the formation of new blood vessels. This process regularly occurs during growth and development in children but happens less often in adults. For example, angiogenesis occurs during the healing of a deep cut or after menstruation. Otherwise, angiogenesis in adults is usually part of a disease process such as cancer.

Angiogenesis is essential for the growth and metastasis (spread) of cancer. A growing tumor requires nutrients and oxygen, which helps it grow, invade nearby tissues, and metastasize. To reach these nutrients, the tumor recruits new blood vessels. In fact, growing tumors can become inactive if they can't find a new supply of nutrients.

Because angiogenesis is necessary in the growth and spread of cancer, each part of the angiogenesis process is a potential target for new cancer therapies. The assumption is that if a drug can stop the tumor from receiving the supply of nutrients, the tumor will "starve" and die. Drugs that stop angiogenesis have become an important part of cancer treatment for many types of cancer.

Current cancer treatments that block angiogenesis

Drugs that are designed to stop angiogenesis are called angiogenesis inhibitors or anti-angiogenesis drugs. Typically, these drugs are given with other types of treatment, such as chemotherapy. The following drugs are examples of angiogenesis inhibitors used to treat cancer. Additional drugs are being evaluated in clinical trials [1] to treat a variety of cancers. Talk with your doctor for more information about these and other cancer drugs

- Thalidomide (Thalomid), a pill that is taken by mouth, appears to stop endothelial cells (cells that line blood vessels) from forming new blood vessels and is a treatment for multiple myeloma [2] and other types of cancer. However, it is harmful to fetuses, so women who are pregnant or plan to become pregnant should not take thalidomide.
- Lenalidomide (Revlimid), a drug that is similar to thalidomide, is also used to treat multiple myeloma and a specific type of myelodysplastic syndrome (MDS) [3]. This drug is a pill that is taken by mouth, and it is a risk to pregnant women and their unborn babies.
- Bevacizumab (Avastin) is a monoclonal antibody, a substance produced in the laboratory. This drug is used to treat many types of cancer including colorectal cancer [4], kidney cancer [5], breast cancer [6], and lung cancer [7]. Bevacizumab is given as an injection.
- Sunitinib (Sutent) is used to treat kidney cancer and gastrointestinal stromal tumor (GIST) [8]. It is also being evaluated for use in other types of cancer. It is a pill that is taken by mouth.
- Sorafenib (Nexavar) blocks angiogenesis in multiple ways. It is also a pill taken by mouth and is used to treat kidney and liver cancers.

Side effects of angiogenesis inhibitors

Because these drugs act on parts of the blood and blood vessels, they tend to have side effects that affect these processes. For example, many angiogenesis inhibitors raise a person's blood pressure. Although this side effect can be serious, it is treatable with medication. Rarely, these medications may cause serious bleeding, heart attacks, heart failure, or blood clots. People at higher risk for these conditions should discuss the risks and benefits of these treatments and ways to monitor these risks. (For example, patients who have had chemotherapy with a class of drugs called anthracyclines or radiation therapy to the chest wall, have a higher risk of congestive heart failure with bevacizumab.)

Other side effects of these drugs may include a rash and/or dry, itchy skin, hand-foot syndrome (tender, thickened areas on the skin, sometimes with blisters on palms and soles), diarrhea, fatigue, and low blood counts. Angiogenesis inhibitors can also interfere with wound healing and cause cuts to re-open or bleed. Rarely, perforations (holes) in the intestines can occur. These are called bowel perforations and usually require surgery to correct. Although some side effects may be common, they do not happen with every drug or with every person.

Questions to Ask the Doctor

When deciding on treatment option, including angiogenesis inhibitors, it may help to get more information from your doctor. Consider asking the following questions:

- What treatment plan do you recommend? Why?
- What are the risks and benefits of this treatment plan?
- What clinical trials are open to me?
- Is an angiogenesis inhibitor part of my treatment plan?
- What side effects should I watch for?
- If I'm worried about managing the costs related to my cancer care, who can help me with these concerns?
- Is there anything else I should be asking?

More Information

Understanding Targeted Treatments [9]

Skin Reactions to Targeted Therapies [10]

Managing Side Effects [11]

Additional Resources

National Cancer Institute: Angiogenesis Inhibitors Therapy: Questions and Answers [12]

Links:
[1] http://www.cancer.net/node/24863
[2] http://www.cancer.net/node/19367
[3] http://www.cancer.net/node/19381
[4] http://www.cancer.net/node/18701
[5] http://www.cancer.net/node/18969
[6] http://www.cancer.net/node/18618
[7] http://www.cancer.net/node/19148
[8] http://www.cancer.net/node/18870
[9] http://www.cancer.net/node/24729
[10] http://www.cancer.net/node/25056
[11] http://www.cancer.net/node/25238
[12] http://www.cancer.gov/cancertopics/factsheet/Therapy/angiogenesis-inhibitors