

CYROSURGERY

Cyrosurgery involves freezing the abnormal cells to death.

Radiation Therapy

Radiation therapy is often used in conjunction with surgery or chemotherapy to remove the cancer cells remaining after a surgery. Radiation therapy involves using high energy rays such as X-rays to destroy the cancer cells. Radiation therapy can be given either before or after surgery, though it is most commonly given along with chemotherapy. Radiation therapy also reduces the risk of tumor recurrence. It can be given as an external beam radiation (the radiation source is a machine placed external to the body) or internal radiation therapy (such as brachytherapy where small pellets or seeds of radiation are placed next to cancer where they emit radiation) or can be endocavitary radiation therapy (a small device placed in the anus which delivers radiation).

Chemotherapy

Chemotherapy involves the use of anticancer chemical drugs which target rapidly multiplying cells. They mainly target cancer cells, since cancer cells divide rapidly, but also target other cells in the body which are not cancerous but divide rapidly, e.g. stomach, hair follicles. The degree of side effects is much higher in chemotherapy. It is administered orally or intravenously.

In metastasized colorectal cancer, chemotherapy is often the first line treatment option. In neoadjuvant setting, it is used prior to the surgery to shrink the tumor while in an adjuvant setting, it is given post surgery to kill remaining cancer cells and prevent recurrence of the cancer tumor. In advanced colorectal cancer, chemotherapy may not cure cancer but can help in shrinking the tumor to some extent, thereby extending the survival time for the patient.

Chemotherapy drugs are most often used in combinations to boost the tumor shrinkage and increase the survival rate. Some of the common chemotherapy drugs used in colorectal cancer treatment are shown in the following table:

Table 12. Colorectal Cancer: Chemotherapy Treatment Options, 2009

GENERIC NAME	BRAND NAME	MANUFACTURER	LINE OF THERAPY
5-Fluorouracil (5-FU)	Adrucil,	Generic	1 st line, 2 nd line and adjuvant
Leucovorin (LV)	Wellcovorin	Generic	1 st line, 2 nd line and adjuvant
Capecitabine	Xeloda	Roche	1 st line, 2 nd line and adjuvant
Irinotecan	Camptosar, Campto	Pfizer, Generic suppliers such as Barr Pharmaceuticals, Teva Pharmaceuticals, APP Pharmaceuticals	1 st line, 2 nd line and adjuvant
Oxaliplatin	Eloxatin, Elplat, DACPLAT, Foloxatine, Transplatin,	Sanofi Aventis and generic suppliers such as Teva Pharmaceuticals	1 st line, 2 nd line and adjuvant
UFT (Uracil/Tegafur)	Uftoral	Taiho Pharmaceuticals	1 st line and 2 nd line
S-1	TS-1	Taiho Pharmaceuticals	1 st line and 2 nd line

Chemotherapy Combinations

The above chemotherapy drugs are usually used in combinations with each other to improve efficacy and efficiency while limiting the side effects. The most common chemotherapy combinations used for treating colorectal cancer are shown in the table below.

Table 17. Chemotherapy combination

5-FU/LV	Leucovorin (folinic acid) + Fluorouracil	Used more in first line Infused regimens are less toxic than bolus
FOLFOX	Leucovorin (folinic acid) + Fluorouracil + Oxaliplatin	Neurotoxicity is common Higher response rate, longer progression free survival than 5-FU/LV
FOLFIRI	Leucovorin (folinic acid) + Fluorouracil + Irinotecan	Alopecia and diarrhea are common Higher response rate, longer progression free survival than 5-FU/LV
XELOX	Capecitabine (Xeloda) + Oxaliplatin	The use of this combination is increasing as it is orally administered Efficacy is similar to FOLFOX
FOLFOXIRI	Leucovorin (folinic acid) + Fluorouracil + Oxaliplatin + Irinotecan	Acceptable toxicity profile with increased neutropenia Initial therapy for patients with metastatic colorectal cancer

Targeted therapy

Targeted therapy utilizes antibodies or small molecules which target only specific cells or pathways of the cells, thereby impairing the growth and development of the cancerous tumor. Prior to the introduction of targeted therapy in the late 1990s, treatment of cancer mainly involved destruction of rapidly dividing cancerous cells, or removal of the affected organ. Targeted therapy is considered a ray of hope for patients who have been suffering from numerous side effects of the above two treatment options.

Avastin

INTRODUCTION

Avastin (bevacizumab) is one of the top selling cancer drugs from Roche/Genentech and Bidel Pharma. It is a humanized, monoclonal antibody which targets the vascular endothelial growth factor (VEGF) to shrink the cancer tumor and increase the patient survival by as low as five months to several months in various settings and indications. Avastin controls the development of blood supply to the cancer tumor by preventing angiogenesis (development of new blood vessels). Currently, Avastin is approved for treatment of five cancer types: colorectal cancer, lung cancer, breast cancer, kidney cancer and brain cancer. Apart from these, Avastin is widely used for the treatment of many other cancer types as an off label treatment option.

Analysis by Region

The United States

In the United States, colorectal cancer is the third most common cancer in men and women. It is estimated that 106,100 cases of colon cancer and 40,870 cases of rectal cancer are estimated to have occurred in 2009. Unlike most of the other countries which are seeing higher colorectal cancer trends, the United States has been experiencing decreasing trends in the last two decades. With an increase in screening programs and technology and efficient treatment regimens, the number of deaths due to colorectal cancer is seeing a negative trend. The mortality rate of colorectal cancer decreased 4.3 percent during 2002 to 2005. In 2009, estimated 49,920 people are expected to have succumbed to this cancer of colon and the rectum.

Screening Guidelines in the United States

The American Cancer Society recommends that, beginning at age 50, men and women should follow one of the following examination schedules to detect colorectal cancer:

- A flexible sigmoidoscopy (FSIG) every five years
- A colonoscopy every ten years
- A double-contrast barium enema every five years
- A Computerized Tomographic (CT) colonography every five years
- A guaiac-based fecal occult blood test (FOBT) or a fecal immunochemical test (FIT) every year
- A stool DNA test (interval uncertain)

Fig 15. The United States Colorectal Cancer Market, 2006 to 2014

The United States CRC Market, 2006 to 2014

