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Chemotherapy–What's in Store?

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When Jeff's uncle was diagnosed with Hodgkin's disease during the 1950s, it was a virtual death sentence. He wasted away from this blood cancer and died within six months. Thanks to chemotherapy, persons with Hodgkin's disease now have a good chance of survival.

Most Americans have heard stories about chemotherapy–usually focusing on the troubling side effects. But there are numerous success stories as well, and there will be many more as new drugs and new techniques become available.

Chemotherapy, the use of drugs or pharmaceuticals to attack cancer cells, has assumed an increasingly important role over the last 50 years, allowing doctors to treat many cancers that were once considered incurable.

The nature of cancer cells is to grow uncontrollably, eventually crowding out normal cells; treatment involves removing, killing or damaging the abnormal cells to the point that they can't continue to reproduce.

When a tumor is well defined and hasn't spread, it can be surgically removed, along with a safe margin of healthy tissue, or destroyed with radiation therapy. Chemotherapy is ordinarily aimed at cancers that have spread or cannot be treated with surgery or radiation alone.

Search and Destroy

The drug–which can be delivered orally, by injection, intravenously or applied to the skin–travels throughout the body to kill or damage cancer cells. In the process, unfortunately, it also harms normal cells, and that is the reason for the side effects–severe nausea, fatigue, a weakened immune system, loss of hair.

Cells most likely to be affected are those that grow fairly rapidly, such as hair follicles, those in the digestive tract, sexual organs and blood cells produced in the bone marrow. The nature and severity of the side effects depends largely on the type of drug used and the dose.

To lessen the severity of side effects, chemotherapy is often given in cycles–treatment periods alternating with rest. There are also drugs that can be prescribed to manage the side effects (such as anti-

emetics to lessen the nausea), and there are many self-help measures–drinking fluids, taking frequent short naps, being diligent about personal hygiene, taking care to avoid infections, buying a wig.

Patients are advised to maintain a balanced diet during chemotherapy with enough calories to prevent weight loss and plenty of protein to rebuild tissues. Those with flagging appetites might try eating frequent small meals and snacks throughout the day.

Most normal cells recover after treatment is over, although it's possible for chemotherapy to cause permanent damage to body organs or to trigger a second cancer many years later.

New drugs and more effective combinations of medications are being discovered all the time. In some cases, researchers have discovered, therapy can be made more effective with fewer side effects by changing the way the drug is administered–by giving a smaller dose over a longer period of time, for example.

Theoretically, more powerful drugs are likely to bring about more powerful side effects, but that is not always the case. Some of the newer medications are designed to hone in on specific molecular traits of cancer cells with little or no effect on normal cells.

For example, an abnormality of the HER2 protein is implicated in about 30 percent of advanced breast cancers. Herceptin, approved in 1998, targets this protein and kills cancer cells without harming normal ones.

Each cancer cell is made up of a complex network of genes and proteins, each with its own set of duties. Gleevec targets a protein called tyrosine kinase that triggers the cancer cell's abnormal drive to reproduce itself. Iressa affects Epidermal Growth Factor Receptor (EGFR), a protein that sends out messages telling the cell to grow and divide. Velcade weakens the cancer cell by damaging its waste disposal system.

Cells need a constant blood supply, and rapidly growing tumors get this supply through angiogenesis–the formation of new blood vessels. Avastin, a monoclonal antibody approved in February, 2004 for metastatic colorectal cancer, works by targeting and inhibiting the function of vascular endothelial growth factor (VEGF), thereby shutting down the tumor's blood supply.

Other drugs with exciting potential are under development or awaiting approval. Due to the nature of their disease, many cancer patients are more than willing to try an investigational drug, and this is possible through enrollment in a clinical trial.

Drugs used in clinical trials have all shown significant promise in the laboratory and in animals but have not yet been approved by the FDA, at least for the use intended.

A phase I trial is designed to determine how the treatment affects the human body, how it should be given and at what dose. Subjects in these studies are usually patients who are getting no benefit from available treatments, and they are monitored carefully for complications and side effects while researchers try to determine the most appropriate dose.

Phase II focuses on whether the treatment does what it's supposed to do and how well it works. Only about a third of drugs in this phase move on to further testing–often because of side effects or complications the researchers didn't anticipate.

By the time a drug reaches Phase III trials, it has been shown to be safe at a certain dosage and effective against a certain kind of cancer. To pass Phase III and be approved, the treatment must be shown to be superior to existing treatments–either more powerful in its anti-cancer effects or with more acceptable side effects.

Phase III trials are typically large and held at various sites. Subjects are randomly chosen to receive either the standard treatment or the one being investigated. Only in rare cases do subjects in the control group receive no treatment.

A doctor may recommend that a patient enroll in a certain clinical trial. Some patients inquire about them, with the hope of getting cutting edge treatment with minimal risk.

With new drugs being added to the arsenal all the time, stories about chemotherapy will continue to grow. In the future, it's to be hoped, the stories will focus less on the troubling side effects and more on the stories of lives saved.

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