

## A new way to treat cancer

Targeted therapies work by going straight to the genes and proteins in cancer cells in order to stop their growth and spread. As a result, cancer cells are affected by the treatment more than healthy cells. They are one of the newest ways to treat breast and other types of cancer.

Researchers are working to identify new ways to target cancer cells for treatment. Once targets are found, therapies can be developed to kill cancer cells. For example, after finding that some breast cancers over-express the HER-2 protein, trastuzumab (Herceptin®) was developed. Other targeted therapies are being studied in clinical trials to see how well they work in treating breast cancer. Most new targeted therapies are given first to women with metastatic breast cancer. As more targets are identified and therapies developed, doctors will be able to offer patients treatment that works best for their type of breast cancer.



## Different views of targeted therapy

A basic definition of “targeted therapy” is any breast cancer treatment that acts in a certain way to stop certain cancer cells. In this sense, chemotherapy and hormone therapy are both targeted therapies. However, most cancer researchers consider targeted therapy to be a new approach to the treatment of breast cancer that targets the inner workings of cancer cells.

Two broad types of breast cancer treatment now exist:

- A **local therapy** affects only a single (limited) area in the body. Surgery and radiation are local therapies.
- A **systemic therapy** affects the entire body. It may be one or more drugs that are taken in pill form or injected.
  - **Chemotherapy** – kills both cancer cells and healthy cells.
  - **Hormone therapy** – blocks the production of hormones in the body or blocks the hormone receptors on the tumors to stop tumors from getting the hormones they need to grow.
  - **Targeted therapy** — targets the the genes and proteins inside cancer cells.

## How do targeted therapies work?

Every cell in the body contains almost 30,000 genes. Each of these genes makes a different protein. Each protein performs a different task for the cell. Targeted therapies stop specific proteins from helping cancer survive. When certain proteins are blocked or stop working the cancer cells can't grow.

## Some types of targeted therapies

- **Monoclonal antibodies** — Antibodies fight infection in the body. For some reason, the body doesn't see cancer as an infection and antibodies are not produced. Monoclonal antibodies are made in a laboratory. Once in the body they seek out specific targets in cancer cells, and in doing so, keep the cancer from growing.

The drug trastuzumab (Herceptin®) is a monoclonal antibody. Some breast cancer cells make too much of a protein called HER-2. Trastuzumab binds to the HER-2 on the surface of the cancer cells. It blocks the HER-2 protein from making the cancer cells grow. It is FDA-approved to treat HER-2 positive early-stage breast cancer after surgery and metastatic HER-2 positive breast cancer. Other uses of trastuzumab are under study in clinical trials.

- **Inhibitors of epidermal growth factor receptors (EGFRs)** — EGFRs are proteins on the surface of cancer cells that accept messages telling the cells to grow and divide. This type of targeted treatment works by blocking the receptors for EGFRs.

- **Enzyme inhibitors** — Enzymes are proteins that cause certain chemical reactions in the body to start. Enzyme inhibitors stop some enzymes from working, and in doing so, block the activity of cancer cells.
- **Proteasome inhibitors** — Proteasomes are found inside of cells. They help regulate cell function and growth by breaking down proteins that are no longer needed by the cell. Proteasome inhibitors stop the proteasomes from working. Cancer cells die when they are unable to dispose of the proteins they no longer need.
- **Angiogenesis inhibitors** — Cancer cells need blood vessels to grow. Angiogenesis inhibitors keep new blood vessels from growing to the tumor. One drug, bevacizumab (Avastin®), is being tested in women with metastatic breast cancer.

## Resources

National Cancer Institute

1-800-4-CANCER

[www.cancer.gov/cancertopics/factsheet/Therapy/targeted](http://www.cancer.gov/cancertopics/factsheet/Therapy/targeted)

### Book

*A New Class of Drugs: Targeted Treatments for Cancer* by David H. Garfield, Kristin A. Cawley, Carolyn Messner. CancerCare®, 1-800-813-HOPE ([www.cancercare.org](http://www.cancercare.org))

#### Sources:

1. Komen "About Breast Cancer" website, Treatment: Emerging Areas in the Treatment of Metastatic Breast Cancer
2. NCI web site, Targeted Cancer Therapies: Questions and Answers
3. NCI web site, Gene Therapy for Cancer: Questions and Answers
4. NCI web site, Herceptin® (Trastuzumab): Questions and Answers
5. NCI web site, Biological Therapies for Cancer: Questions and Answers
6. NCI web site, Angiogenesis Inhibitors in the Treatment of Cancer
7. Dr. Susan Love's Breast Book, 4th Edition, pages 557, 310, 416, 506-507, 311
8. A New Class of Drugs: Targeted Treatments for Cancer by CancerCare.org

## Questions to ask your doctor

- What are my treatment options?
- Is a targeted therapy right for me?
- Is the cost covered by my health insurance?
- What clinical trials could I join?
- What are the risks of using trastuzumab (Herceptin®)?

### Related fact sheets in this series:

- Clinical Trials
- Current Research on Drugs & Treatment
- Making Treatment Decisions
- New Drugs for Breast Cancer Treatment
- Treatment Choices — An Overview

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