Forbes http://onforb.es/13uocGO

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PHARMA & HEALTHCARE 2/22/2013 @ 1:44PM | 6,264 views

Targeted Breast Cancer Drug Ushers in a New Era of Cancer Treatment

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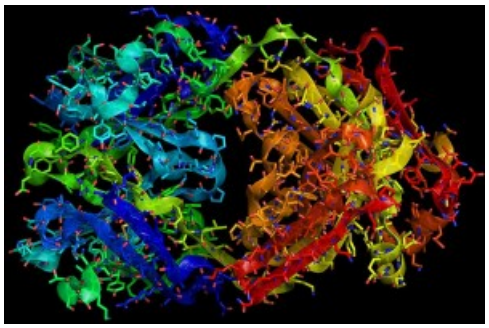

Herceptin image credit: Wikipedia

The Food and Drug Administration (FDA) has approved a new drug for treating breast cancer that effectively targets tumors, thus minimizing damage to other cells in the body.

The drug Kadcyla (kad-SY'-luh) from Roche combines the established drug Herceptin with a powerful chemotherapy drug and a third chemical linking the medicines together. According to an AP report, the chemical keeps the drug combination intact until it binds to a cancer cell and delivers its anti-tumor cocktail.

Regular chemotherapy works like an indiscriminate nuclear weapon — it destroys a massive amount of healthy cells along with cancerous cells. Targeted cancer treatment is more akin to a cruise missile that's programmed to detonate only when it reaches a specified target.

The FDA approved the new treatment for about 20 percent of breast cancer patients with a form of the disease that is typically more aggressive and less responsive to hormone therapy. These patients have tumors that overproduce a protein known as HER-2.

The FDA approved the drug based on company studies showing Kadcyla delayed the progression of breast cancer by several months. Patients treated with the drug lived 9.6 months before death or the spread of their disease,

At $9,800 per month, Kadcyla treatment will initially run more than double the cost of Herceptin (roughly $4,500 per month). Roche estimates a full course of Kadcyla, about nine months of medicine, will cost $94,000.

The concept of "delivering" anti-cancer drugs to targeted tumors has been in development for more than two decades, but the last few years have seen exceptional progress. The next phase of targeted treatment will likely involve nanoparticles — smaller-than-microscopic transport vehicles that are injected into the body and deliver their devastating payload only to a cancerous tumor.

Researchers have been experimenting with different materials to create nanoparticles since the 1990s. The first promising candidates were lipids –naturally occurring molecules that include fats and waxes–but they are generally too large to penetrate tumors effectively and are quickly removed from the body.

The latest candidates are polymers–synthetic molecules that can be tailored to the type of medication they are meant to deliver.

According to Juntao Luo, PhD, a researcher working on polymer nanoparticles at the Upstate Medical University of New York: "The general concept is that one nanoparticle may not be able to deliver different types of medications. You may need to design a nanoparticle for each medication." He adds that nanoparticles may need to be further tailored to individual patients, who may respond differently to medications depending on the stage and markers of their cancer.

"Polymer nanoparticles carry the medication to the tumor site within 24 hours. Remnants of the nanoparticles are flushed from the body through the kidneys. While they are designed to work most effectively in solid tumors, nanoparticles may also help fight some cancers of the blood," Luo says.

Other nanoparticle treatments are also being explored, including the use of metals like gold to serve as the payload vehicle. Pharmaceutical giant AstraZeneca recently announced that it has made significant advances in using gold as a means to piggyback cancer drugs targeted for tumors. Gold flecks are durable enough to carry a large amount of a given drug, and 5,000 flecks can fit on the width of a human hair.

The big takeaway is that we may be approaching a turning point in cancer treatment. With FDA approval of new drugs like Kadcyla, and human trials of nanoparticle cancer therapy in the offing, it is possible that humanity is finally gaining the upper hand on a disease that once seemed invulnerable.

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