Genetic and Stem Cell Therapies to Treat Cancers By [**Steve Brachmann**](http://www.ipwatchdog.com/author/sbrachmann/) on March 12, 2015



The term “cancer” is used to refer to not one but actually a collection of diseases which involve the uncontrollable division of cells within tissues of the human body. [**There are more than 100 types of cancer that can affect the human body**](http://www.cancer.gov/cancertopics/what-is-cancer), from the more common carcinomas of the breast or lungs to rare types of melanoma affecting the skin. The American Cancer Society estimates that there will be about [**1,658,370 new cancer cases diagnosed and 589,430 cancer deaths in America during 2015**](http://www.cancer.org/research/cancerfactsstatistics/cancerfactsfigures2015/index).

Where are we currently in the fight against cancer, one of the leading causes of human death all over the world? There are certainly some signs for hope. One of them came recently from Princeton University, where graduate students worked on a project which i[**dentified a treatment for blocking an enzyme which is important for metastasis**](http://www.princeton.edu/main/news/archive/S42/50/69O43/index.xml?section=topstories,featured), or the spread of cancer through a patient’s body. However, many experts in the field still think that we have quite a way to go before finding anything resembling a cure for cancer, [**sometimes urging caution in the face of media reports of cancer cures**](http://www.healthline.com/health-news/vice-may-have-overstated-case-in-killing-cancer-030615#1).

We’ve been noting some intriguing innovations in the fight against cancer here at IPWatchdog, mostly coming from academic institutions such as the [**University of California**](http://www.ipwatchdog.com/2015/02/11/the-university-of-california-patents-treatments-for-cancer-and-alzheimers-disease/id=54535/)and [**Stanford University**](http://www.ipwatchdog.com/2015/02/23/stanford-university-invents-treatments-for-cancer-parkinsons-and-ptsd/id=54887/). Today, we thought we’d take a look at the news surrounding leading cancer research facilities from around to gain a greater understanding of how the war against cancer is currently being fought in hospitals and laboratories across the globe.

**The Cost of Cancer Drugs and the Importance of Funding**

Receiving a cancer diagnosis is difficult enough but a new patient must also contend with the incredibly high price of drugs that might be prescribed to fight tumorous growths. In October 2012, the National Institutes of Health released statistics indicating that cancer patients, even those who have private insurance, ended up [**spending an average of $1,500 each during 2003 and 2004**](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3538397/); one quarter of those patients paid more than $5,000. A recent episode of *60 Minutes* from last October reported that [**the price for a new cancer treatment costs well over $100,000 per year**](http://www.cbsnews.com/news/the-cost-of-cancer-drugs/), which becomes incredibly cumbersome for those who don’t have good or any health insurance.

Of course, it costs much, much more money than that to successfully develop a cancer treatment and then bring it to market. A 2013 fact sheet published by biopharmaceutical trade group PhRMA found that [**the average cost to develop a single drug was $1.2 billion by the early 2000s**](http://www.phrma.org/sites/default/files/pdf/PhRMA%20Profile%202013.pdf). This price includes the cost of drug development failures that couldn’t pass a certain trial or otherwise couldn’t be commercialized. Interestingly, PhRMA’s research also found that 83 percent of life expectancy gains for cancer patients are attributable to new medical treatments.

The difficulties and high costs of drug development have created a market for pharmaceuticals, including cancer treatments, that sometimes follows some seemingly strange economic rules. For example, pharmaceutical manufacturer [**AbbVie Inc. recently paid $21 billion for only part-ownership in a company which has developed a treatment for blood cancers that hasn’t earned more than $1 billion in sales yet**](http://www.wsj.com/articles/how-much-is-one-cancer-drug-worth-1425602765). Economists predict that the treatment, known as Imbruvica, will eventually earn $6 billion per year, but it does outline the high costs and risks of operating in the development of pharmaceuticals.

Public funding often becomes a lifeline for drug development activities, especially at universities and other academic institutions. In early March, [**Kentucky’s State Senate voted to fund half of a $265 million project**](http://wfpl.org/senate-oks-132-5-billion-bond-university-kentucky-cancer-research/) to fund activities at the school’s cancer center. Academic institutions often lead the charge in developing treatments and pharmaceutical therapies that attack cancer. In addition to the universities we’ve covered recently, [**Penn State recently received a patent for a medical treatment that attacks tumors with the use of nano-scale liposomes**](http://www.nanotech-now.com/news.cgi?story_id=51035).

**Advances in the Fight Against Lung Cancer**

Lung cancer is the second-most common cancer affecting humans; the [**estimated 221,200 new cases of lung cancer that the American Cancer Society expects to be diagnosed this year**](http://www.cancer.org/cancer/lungcancer-non-smallcell/detailedguide/non-small-cell-lung-cancer-key-statistics) trails only breast cancer. 27 percent of all cancer deaths are attributable to lung cancer, making it the top killer among all cancers. One out of every 13 men will develop lung cancer in their lifetimes; one out of 16 women will as well.

Cigarette smoking is a major contributing factor to a person’s risk of developing lung cancer in their lifetime. However, non-smokers can also develop the disease and those who have quit may want to seek out lung cancer screening, even if they haven’t touched a cigarette in years. Interestingly, as the rate of smoking declines among American citizens, [**lung cancer cases among those who have quit for more than 15 years have risen**](http://www.cnn.com/2015/02/24/health/lung-cancer-screening/). Current U.S. guidelines recommend annual low-dose CT screening only for those adults who have smoked 30 pack years (one pack a day for 30 years) and have smoked within the past 15 years, and insurance providers use those guidelines to pay for scans.

Recently, the U.S. Food and Drug Administration approved the use of a new lung cancer treatment that can help those fighting lung cancer from developing recurrences of the disease. [**Opvido, developed by Bristol-Myers Squibb**](http://www.nytimes.com/2015/03/05/business/lung-cancer-treatment-using-immune-system-wins-fda-approval.html?_r=0), is a drug that essentially trains a body’s immune system to recognize tumors; the immune system is typically unable to attack cancers because they don’t recognize cancerous growths as a problem. This treatment[**provides a lifeline to those patients who might not be responding well to chemotherapy or radiation treatment**](http://time.com/3735792/opdivo-immunotherapy-lung-cancer/).

Nanotechnology is also helping to solve some of the problems in treating lung cancers. Researchers at the Nanosystems Initiative Munich have [**developed nanocarrier particles which are capable of selectively releasing pharmaceutical drugs directly at the site of a tumor**](http://phys.org/news/2015-03-medical-nanoparticles-local-treatment-lung.html). The selective targeting of cancerous cells and tissue can treat tumors without creating the negative side effects to other tissues caused by other cancer treatments, again like most chemotherapies.

**Genetic and Stem Cell Therapies to Treat Cancers**

Many methods of treating cancers can be incredibly damaging to a patient’s body. There are a number of chemotherapies which can [**cause a long list of side effects**](http://www.cancer.org/acs/groups/content/@nho/documents/document/acsq-009502.pdf), from fevers and vomiting to loss of appetite. Radiation therapy, which is often a part of a patient’s prescribed course of treatment for cancer, can also damage healthy cells near the site of a tumor. There are many cancer treatments that are developed with an eye towards minimizing the difficult side effects caused by a regimen of chemotherapy or radiation.

Stem cell treatments could help to provide some of that answer. [**The British government recently approved the use of genetically modified bone marrow stem cells to treat lung cancer cells**](http://www.theguardian.com/society/2015/mar/06/lung-cancer-stem-cell-therapy-trial-uk). The modified bone marrow stem cells, which can be provided by a donor who does not match the patient’s genetic profile perfectly, are designed to activate an anti-cancer gene in lung cancer patients. It’s yet to be seen how the drug will fare with a large number of patients.

A lot of research has also gone into cancer treatments which leverage the genetic analysis of a patient. Another project in Great Britain has found that [**the genetic analysis of breast cancer patients can help to inform the type of treatment administered to them**](http://www.cancerresearchuk.org/about-us/cancer-news/news-report/2015-03-04-gene-signature-could-predict-breast-cancer-aggressiveness). It’s hoped that the treatment will help to better target a type of breast cancer that carries a stem cell signature helping it to replicate itself more quickly.

Genetic analysis is also helping to aid in the fight against pancreatic cancer. Pancreatic cancer is a tremendous killer; the American Cancer Society predicts that 48,960 people will be diagnosed with pancreatic cancer this year, a much lower rate than many other cancers. However, [**40,560 people will die from pancreatic cancer in 2015**](http://www.cancer.org/cancer/pancreaticcancer/detailedguide/pancreatic-cancer-key-statistics), about seven percent of all cancer deaths. In February, British researchers were [**able to identify differences in pancreatic tumors based on the reshuffling of DNA within a patient’s body**](http://www.cancerresearchuk.org/about-us/cancer-news/press-release/2015-02-25-pancreatic-cancer-has-four-distinct-types). This greater understanding of these four different types of pancreatic cancer could be used to better select targeted drugs for a patient.