

Genomic Testing for Cancers

By: Rapid Access International, Inc.

February 2019

To set the stage for what is a rather complex topic of genomics and its impact on cancer treatment, we turn to the Dana-Farber Cancer Institute in Boston Massachusetts. The following is taken from an article entitled "Understanding Genomics and Cancer"¹:

If the new era of "targeted" cancer drugs and personalized treatments for patients realizes its promise, the power of genomics will get a lot of the credit...

What is genomics?

Most people know that genetics is the study of genes and how they affect health and disease, and it's been said that that cancer is a disease of genes. Today, that's been amended – cancer is a disease of the genome – the entire complement of human DNA. "Genomics" is the bigger picture; it looks at how combinations of many genes, non-gene DNA, and environmental factors interact to cause disease. The human genome consists of about 20,000 genes (plus a lot of genetic material of unknown function) which carry the DNA code for making proteins and operating the processes of life. The study of genomics really started with the complete deciphering of the human genome in 2003.

How is genomics used in cancer research and treatment?

Normal cells form tumors when they are spurred into endless, runaway growth by changes to the DNA in their genome. Mutations, broken chromosomes, missing or excess DNA segments – these have all been linked to cancer development and how a tumor behaves. Genomic methods can identify patterns of abnormalities that help diagnose a cancer, and these patterns – called tumor profiles – can now be used, in some cases, to select targeted drugs that are likely to be effective against that particular tumor profile.

Cancer Genomics

Much research has and continues to focus on the causes of cancer through the analysis of cancer genomes to "map their 'landscapes' of alterations compared to normal cells."² At this point, many important gene mutations that drive various cancers, including brain tumors, ovarian cancer, breast cancer, leukemia, lymphoma, etc., have been identified through DNA sequencing ("a letter-by-letter reading of the genetic code in a cancer genome").³

Genomic Testing and Treatment

¹ "Understanding Genomics and Cancer". InSight, from Dana-Farber Cancer Institute. April 25, 2014. Available at: <https://blog.dana-farber.org/insight/2014/04/understanding-genomics-and-cancer/>. Accessed on February 28, 2019.

² *Ibid.*

³ *Ibid.*

In recent years, this prevalence of research has created a pool of data that can be utilized for genomic testing and determination of the best course of treatment for cancer patients. This new approach has been pioneered by companies like Foundation Medicine, which has steadily evolved their range of testing capabilities in its relatively short history.

Foundation Medicine

Based in Cambridge, Massachusetts, Foundation Medicine, Inc. develops, manufactures, and sells genomic testing solutions for cancers. The company launched in 2010 with a \$24 million Series A financing by Third Rock Ventures. It has since expanded its portfolio of testing solutions with Swiss drugmaker Roche acquiring a 56.3% stake in the company for \$1.03 billion in 2015.⁴ In June, Roche acquired the rest of Foundation Medicine for \$2.4 billion; valuing the company last year at \$5.3 billion⁵.

Foundation Medicine has worked directly with physicians, as well as through its many biopharma partners to analyze patient samples. The company reports on its website that it has profiled over 200,000 patients and it has over 30 biopharma partners.⁶

These more than 200,000 genomic profiles include information on 150 subtypes of cancer, comprising what is known as the company's FoundationCore database. Much of this data has been released in the form of anonymized records to the National Cancer Institute's Genomic Data Commons portal.

All the while, Foundation Medicine's testing capabilities have steadily evolved to handle a full range of sample types; the latest of which was launched in the fall season of 2018.

This company is uniquely positioned to support personalized and targeted medical treatment through the use of its pioneering genomic testing capabilities and data services that help pharmaceutical companies to develop and test new personalized medicines.

⁴ Winslow, Ron. "Roche Holding to Pay \$1.03 Billion for Diagnostics-Firm Stake". The Wall Street Journal. January 12, 2015. Available at: <https://www.wsj.com/articles/roche-holding-to-pay-1-03-billion-for-diagnostics-firm-stake-1421042401>. Accessed on February 28, 2019.

⁵ Shields M, Hirschler B. "Roche pays \$2.4 billion for rest of cancer expert Foundation Medicine". Reuters. June 19, 2018. Available at: <https://uk.reuters.com/article/us-roche-hldg-m-a-fmi/roche-pays-2-4-billion-for-rest-of-cancer-expert-foundation-medicine-idUKKBN1JF0F3>. Accessed on February 28, 2019.

⁶ Foundation Medicine Website. About Section. Available at: <https://www.foundationmedicine.com/about>. Accessed on February 28, 2019.