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Case Series

# Early use of Next Generation Sequencing Provided Alternative Treatment Options to 32.24% Cancer Patients (Avoiding or Delaying Chemotherapy): Retrospective Study in Solid Tumors at Beverly Hills Cancer Center

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## ABSTRACT

Our providers' continuous efforts to obtain Next-generation sequencing for their cancer patients as early as possible followed by matched therapy has provided new therapeutic options to our solid tumors patients. We report our experience here with this approach in everyday clinical practice at the Beverly Hills Cancer Center along with our robust clinical research program. This retrospective study included 95 solid tumor patients who were genotyped with the FDA-approved Guardant360 CDx that provides comprehensive genomic results from a blood draw in seven days X. Our oncologists use it on regular basis for tumor mutation profiling, also known as Comprehensive Genomic Profiling (CGP), across all solid cancers and also as a companion diagnostic to identify non-small cell lung cancer patients who may benefit from treatment with Tagrisso® (osimertinib), RYBREVANT™ (amivantamab-vmjw), and LUMAKRAS™ (sotorasib).

**Keywords:** Metastatic solid tumors; Lung cancer; Colorectal cancer; Breast cancer; Metastatic; Next-generation sequencing; NGS; Molecular profiling; Targeted therapy; Precision medicine

## INTRODUCTION

Historically, when patient is diagnosed with cancer that metastases to distant organs the standard of care treatment option was limited to chemotherapy. Recently, as additional therapies are studied and proven to provide better results and less adverse events than chemotherapy, the goal shifted to identify these more effective alternative treatment options as early as possible at the time of diagnosis or progression. These efforts were boosted with commercialization of high-throughput testing that can identify genes alterations associated with cancer [1].

## CASE PRESENTATION

In many cases, some of the identified genetic changes in each patient can be matched to a targeted therapy if the respective therapeutic agent is approved in this indication or even other indications. In this retrospective study, we studied how the use of NGS in the community setting affected the determination of treatment options to cancer patients [2].

All 152 patients with metastatic solid tumors had cancer-related genetic alterations, and, in 49 of them (32.24%), these could be, in theory, matched to a genomically directed therapy. 37 patients (24.34%) were initially matched or recommended to participate in an ongoing clinical trial whether at Beverly Hills Cancer Center or in another center within a 50 miles radius (Tables 1 and 2) [3]. Everything begins with a solitary transformation. The DNA strand is presently compromised. A transformation/duplication of a solitary nucleotide or nucleotide exhaustion upsets the DNA grouping. This adjustment of the genome is irreversible and can prompt the change of an ordinary cell into a growth cell. Malignant growth can spread to local tissues or far off organs through the lymph framework and circulation system.

**Table 1:** Retrospective review of patients with diagnosis.

| Diagnosis | Number of patients | Percentage |
|---|---|---|
| Colorectal adenocarcinoma | 97 | 63.82% |
| Lung adenocarcinoma | 16 | 10.53% |
| Breast carcinoma | 15 | 15.13% |
| Pancreatic ductal adenocarcinoma | 3 | 1.97% |
| Melanoma | 3 | 1.97% |

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|---|---|---|
| Gastric adenocarcinoma | 3 | 1.97% |
| Small cell lung carcinoma | 2 | 1.32% |
| Prostate adenocarcinoma | 2 | 1.32% |
| Uterine leiomyosarcoma | 1 | 0.66% |
| Squamous cell carcinoma of oropharynx | 1 | 0.66% |
| Squamous cell carcinoma | 1 | 0.66% |
| Soft tissue sarcoma | 1 | 0.66% |
| Rectal cancer | 1 | 0.66% |
| Hepatocellular carcinoma | 1 | 0.66% |
| GIST (Gastrointestinal stromal tumor) | 1 | 0.66% |
| Gallbladder carcinoma | 1 | 0.66% |
| Extrahepatic cholangiocarcinoma | 1 | 0.66% |
| Cholangiocarcinoma | 1 | 0.66% |
| Ampullary carcinoma | 1 | 0.66% |
| Grand total | 152 | 100.00% |

**Table 2:** Gender wise review.

| Patient gender | Number of patients | Percentage |
|---|---|---|
| Female | 69 | 60.20% |
| Male | 83 | 39.80% |
| Grand total | 152 | 100.00% |

The Strong growths contain strange and heterotypic cells that impart through close and hole intersections. Interestingly, with fluid growths, as the phones increase, they structure a "mass" called a strong cancer and generally don't contain pockets of liquid, discharge, air, or different substances. Strong growths can be either non-dangerous, pre-threatening cells that can possibly become harmful, or dangerous. The genomic foundation of pediatric cancers is not quite the same as that of grown-up growths. A similar cancer types will quite often have totally unique transformation profiles contrasted with their grown-up partners. Insights have uncovered that in youngsters, strong growths make up around 40% of all tumors. The most well-known and forceful kind of strong cancer found in youngsters is a mind tumor. The multi-stage component of metastatic growths begins with leap forward of essential cells and passage into the lymphatic framework or fringe dissemination followed by penetration of fundamental tissue where they form into growths. Virtually all strong cancers require the development of a neo-vasculature that permits them to develop and spread through vascular metastasis. Metastatic growths address the most elevated danger to disease patient mortality. Malignant, pre-dangerous, and harmless cancers each have their characterizing qualities. Appropriately distinguishing these is a basic advance each specialist needs to take. Whether you are utilizing formalin-fixed paraffin-implanted tissue tests or new frozen tissue examples, clinical analysts are enabled to examine, analyses, or break down research growth tests (Tables 3-7).

**Table 3:** Percentage of patients having FDA.

| Actionable mutation with associated FDA-approved therapies | Number of patients | Percentage |
|---|---|---|
| No | 112 | 73.68% |
| Yes | 49 | 32.24% |
| Grand total | 152 | 100.00% |

**Table 4:** Percentage of patients with clinical trials.

| Clinical trials | Number of patients | Percentage |
|---|---|---|
| N/A | 115 | 75.66% |
| Yes | 37 | 24.34% |
| Grand Total | 152 | 100.00% |

**Table 5:** Percentage of patients with biomarkers.

| Gene or Biomarker | Number of patients | Percentage |
|---|---|---|
| MSI-High | 55 | 18.64% |
| TP53 | 51 | 17.29% |
| PIK3CA | 20 | 6.78% |
| EGFR | 15 | 5.08% |
| RB1 | 11 | 3.73% |
| ERBB2 | 11 | 3.73% |
| ARID1A | 10 | 3.39% |
| APC | 10 | 3.39% |
| FGFR2 | 8 | 2.71% |
| ATM | 8 | 2.71% |
| BRAF | 7 | 2.37% |
| KRAS | 6 | 2.03% |
| CDK12 | 6 | 2.03% |
| MET | 5 | 1.69% |
| BRCA2 | 5 | 1.69% |
| MYC | 4 | 1.36% |
| ESR1 | 4 | 1.36% |
| CCNE1 | 4 | 1.36% |
| CCND1 | 4 | 1.36% |
| TERT | 3 | 1.02% |
| SMAD4 | 3 | 1.02% |
| KIT | 3 | 1.02% |
| DDR2 | 3 | 1.02% |
| AR | 3 | 1.02% |
| PTEN | 2 | 0.68% |
| PDGFRA | 2 | 0.68% |
| NRAS | 2 | 0.68% |
| NF1 | 2 | 0.68% |
| HNF1A | 2 | 0.68% |
| GNAS | 2 | 0.68% |
| FGFR3 | 2 | 0.68% |
| FBXW7 | 2 | 0.68% |
| CDKN2A | 2 | 0.68% |
| BRCA1 | 2 | 0.68% |
| VHL | 1 | 0.34% |
| STK11 | 1 | 0.34% |
| ROS1 | 1 | 0.34% |
| RET | 1 | 0.34% |

| | | |
|---|---|---|
| RAF1 | 1 | 0.34% |
| NTRK3 | 1 | 0.34% |
| NTRK1 | 1 | 0.34% |
| MLH1 | 1 | 0.34% |
| JAK2 | 1 | 0.34% |
| IDH1 | 1 | 0.34% |
| HRAS | 1 | 0.34% |
| FGFR2-TACC2 | 1 | 0.34% |
| FGFR1 | 1 | 0.34% |
| CTNNB1 | 1 | 0.34% |
| CDK6 | 1 | 0.34% |
| AKT1 | 1 | 0.34% |
| Grand Total | 295 | 100.00% |

**Table 6:** Percentage of patients with SAD.

| Somatic Alteration Detected? | Number of patients | Percentage |
|---|---|---|
| Yes/Detected | 65 | 42.76% |
| No/Not detected | 87 | 57.24% |
| Grand total | 152 | 100.00% |

**Table 7:** Patients showing lack of response.

| Lack of response | Number of patients | Percentage |
|---|---|---|
| Evidence of lack of response to a specific treatment option | 6 | 3.95% |
| No evidence | 146 | 96.05% |
| Grand total | 152 | 100.00% |

## DISSCUSSION

The science of malignant growth is a perplexing transaction of numerous hidden cycles, occurring at various scales. An assortment of hypothetical models have been created, which empower one to study certain parts of the carcinogenic development process. Not with-standing, most past approaches just spotlight on explicit parts of growth advancement, to a great extent disregarding the impact of the developing cancer climate. An integrative system to reproduce cancer development, including those model parts that are viewed as critical. Lloyd et al. created by resolving issues at the tissue level, where the peculiarities is displayed as continuously halfway differential conditions. They expanded this model with applicable parts at the cell or even subcellular level in an upward manner. The Execution of this system covers the significant cycles and treats the mechanical twisting because of development, the biochemical reaction to hypoxia, blood stream, oxygenation and the express advancement of a vascular framework in a coupled manner.

The Side effects incorporate seizures, morning cerebral pains, regurgitating, crabbiness, conduct issues, and changes in eating or resting propensities, laziness, or awkwardness. Determination is regularly troublesome, in light of the fact that these side effects can and frequently do demonstrate quite a few different issues, either physical or emotional. Retinoblastoma is malignant growth of the eye. It very well might be inherited, and 33% of the cases include both eyes. If analyzed early, it is feasible to obliterate the cancer with radiation treatment and save typical vision. If the growth is really huge that there is no desire for keeping up with helpful vision utilizing radiation, the eye is eliminated. In cases where the two eyes are involved, an endeavor is made to safeguard vision in the two eyes through therapy with radiation. At the point when cutting-edge illness is found in the two eyes, an endeavor is made to safeguard vision in something like one eye. Whenever there is any chance of valuable vision, all endeavors are made to protect it. Chemotherapy, radiation, or both may likewise be utilized to treat metastases.

As a private, academic community-based cancer center, Beverly Hills Cancer Center not only provides state-of-the-art cancer treatment modalities all under one roof, but also leading clinical trials and research for cancer, which are offered at very few centers in the world, attracting patients globally, and saving lives. By providing access to groundbreaking clinical trials, the Beverly Hills Cancer Center offers patients the opportunity to participate in the most advanced cancer treatments currently in development in the world [4,5].

## CONCLUSION

Beverly Hills Cancer Center is composed of an internationally-recognized multidisciplinary medical team consisting of medical oncologists, radiation oncologists, radiologists, hematologists and internists who provide exceptional patient care and support services including a robust and highly efficient team of clinical research professionals.

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