An evaluation of genomic tumor testing results and treatment outcomes for patients with primary brain tumors enrolled in the Maine Cancer Genomics Initiative (MCGI)

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Introduction

- Comprehensive NGS-based genomic tests interrogating a large number of genetic alterations in tumor tissue have recently been developed but many barriers exist in using the results in the clinical management of patients.
- The MCGI, a partnership between JAX, the Maine Medical Center Research Institute (MMCRI) and the largely rural Maine oncology community, was established to facilitate the integration of novel genomic technologies into community oncology practice.
- Key components of the MCGI include free genomic testing, an education program, genomic tumor board support and dedicated operational support from the MCGI project office.

Methods

- The MCGI study protocol allowed enrollment of any patient with a solid tumor and appropriate performance status (ECOG 0-2). The patient’s treating physicians had to enroll on the study protocol prior to enrolling the patient.
- The patient cohort for this analysis consisted of 105 patients with primary brain tumors enrolled in the MCGI between the initiative’s start date in mid-2017 through 1/1/20.
- 96 of the 105 had successful GTT reports issued, indicating a success rate of 91.4% for the primary brain tumor cohort, which is higher than the success rate for the total study population of 84.2%.
- Two sources of data were used for this analysis: GTT reports and treatment data for each patient.
- The analysis consisted of two distinct parts: a genetic profile of the primary brain tumors, and an analysis of the treatment data for the patient cohort.

Components of the Genetic Profile:
- Classification of primary brain tumors by subtype
- Commonly mutated genes in primary brain tumors
- Commonly mutated genes by brain tumor subtype

Components of the Treatment Data Analysis:
- Treatments prescribed by number of times occurring
- Number of courses of treatment per patient
- Total length of time on treatment by patient and treatment course
- Treatment type and duration for patients receiving targeted (or PD-L1) therapies

Results: Genetic Profile

- Classification by Brain Tumor Subtype
  - Glioblastoma
  - Oligodendroglioma
  - Astrocytoma
  - Unspecified

Frequency of Mutated Genes in all Primary Brain Tumors

Frequency of Mutated Genes in Glioblastomas

Frequency of Mutated Genes in Astrocytomas

Frequency of Mutated Genes in Oligodendrogliomas

Length on Treatment for Patients with Primary Brain Tumors

Figure 1: Breakdown of brain tumor subtypes within the MCGI cohort of primary brain tumor cases. N=105

Figure 2: Frequency of mutated genes for all successful primary brain tumor GTT reports. N=80 tumors with 211 clinically significant aberrations

Figure 3: Frequency of mutated genes for successful GTT reports on glioblastomas. N=66 glioblastomas with 162 clinically significant aberrations

Figure 4: Frequency of mutated genes for successful GTT reports on astrocytomas. N=8 astrocytomas with 16 clinically significant aberrations

Figure 5: Frequency of mutated genes for successful GTT reports on oligodendrogliomas. N=4 oligodendrogliomas with 8 clinically actionable aberrations

Figure 6: This graph shows the total length of time on treatment for each of the primary brain tumor patients; the range is anywhere from 0 days to over 5 years, but the average duration of each course of treatment is 142.3 days. Each column represents a single patient, and each color represents a different course of treatment for that patient. 35 of the 105 patients are currently undergoing treatment (as of their last study visit), denoted by asterisks above relevant bars.

Conclusions

- 105 primary brain tumor patients enrolled in MCGI as of 1/1/20, majority glioblastomas
- 96 successful reports out of 105 total
- Most commonly mutated genes: EGFR, TP53, IDH1, CDKN2A, PTEN
- Average 2.08 courses of treatment per patient; average duration of treatment course: 142.3 days
- 12+ patients receiving targeted therapies or PD-1/PD-L1 therapies as a result of MCGI services (GTT, GCTs, etc.)
- Altogether, this analysis has provided a better understanding of the primary brain tumor patient cohort within the MCGI. This analysis also paves the way to future work that will better help us understand the impact of the MCGI on Maine brain tumor patients.

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