

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

Lily Waddell¹, Annie Schulmann², Jennifer Bourne, MS¹, Petra Helbig, CCRP¹, Christine Lu-Emerson, MD³, Jens Rueter, MD¹
The Jackson Laboratory (JAX), Augusta, ME¹; Colby College, Waterville, ME²; Maine Medical Partners Neurology / Maine Medical Center, Portland, ME³

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

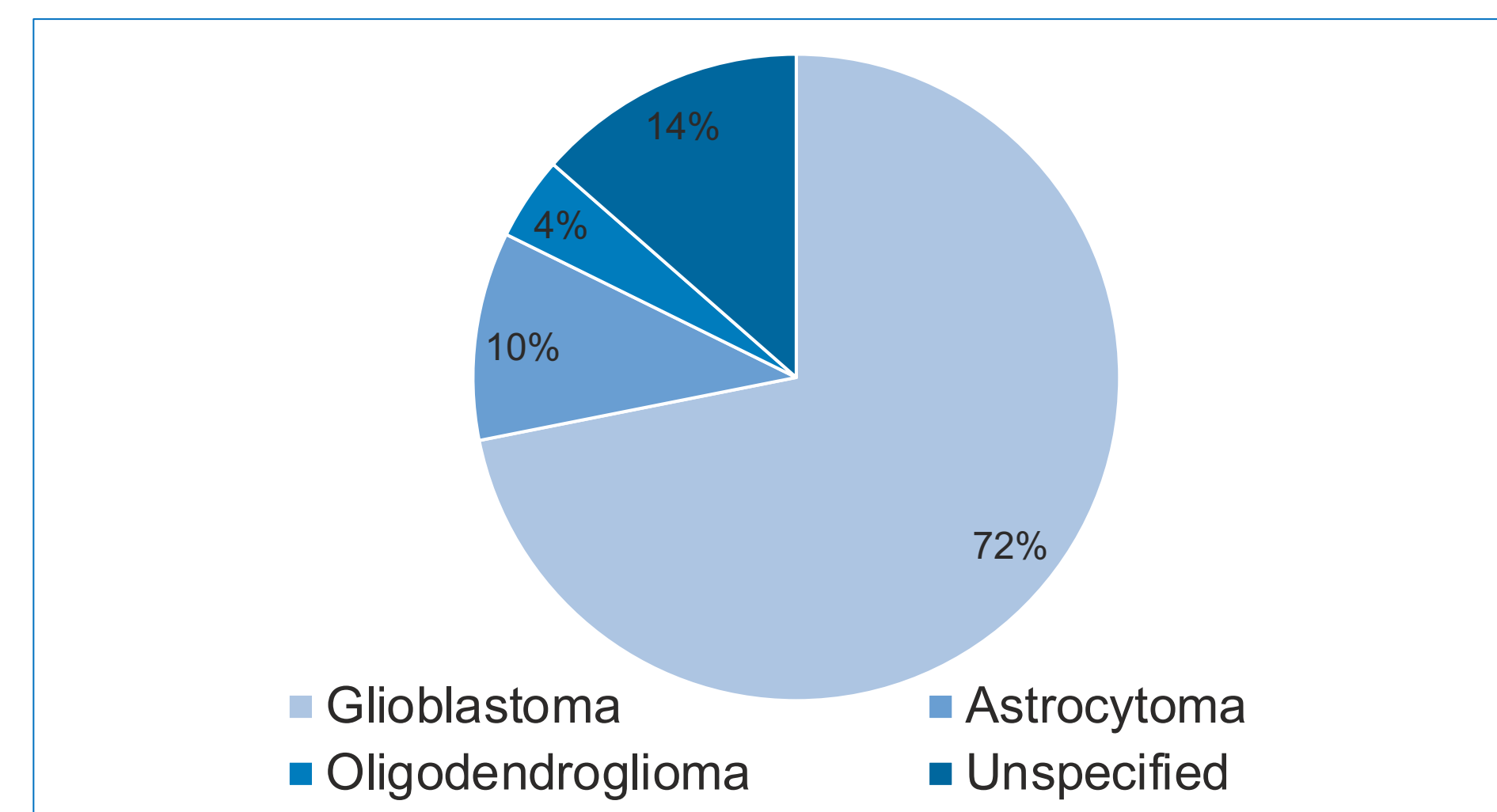


Figure 1: Breakdown of brain tumor subtypes within the MCGI cohort of primary brain tumor cases. N=105

Frequency of Mutated Genes in all Primary Brain Tumors

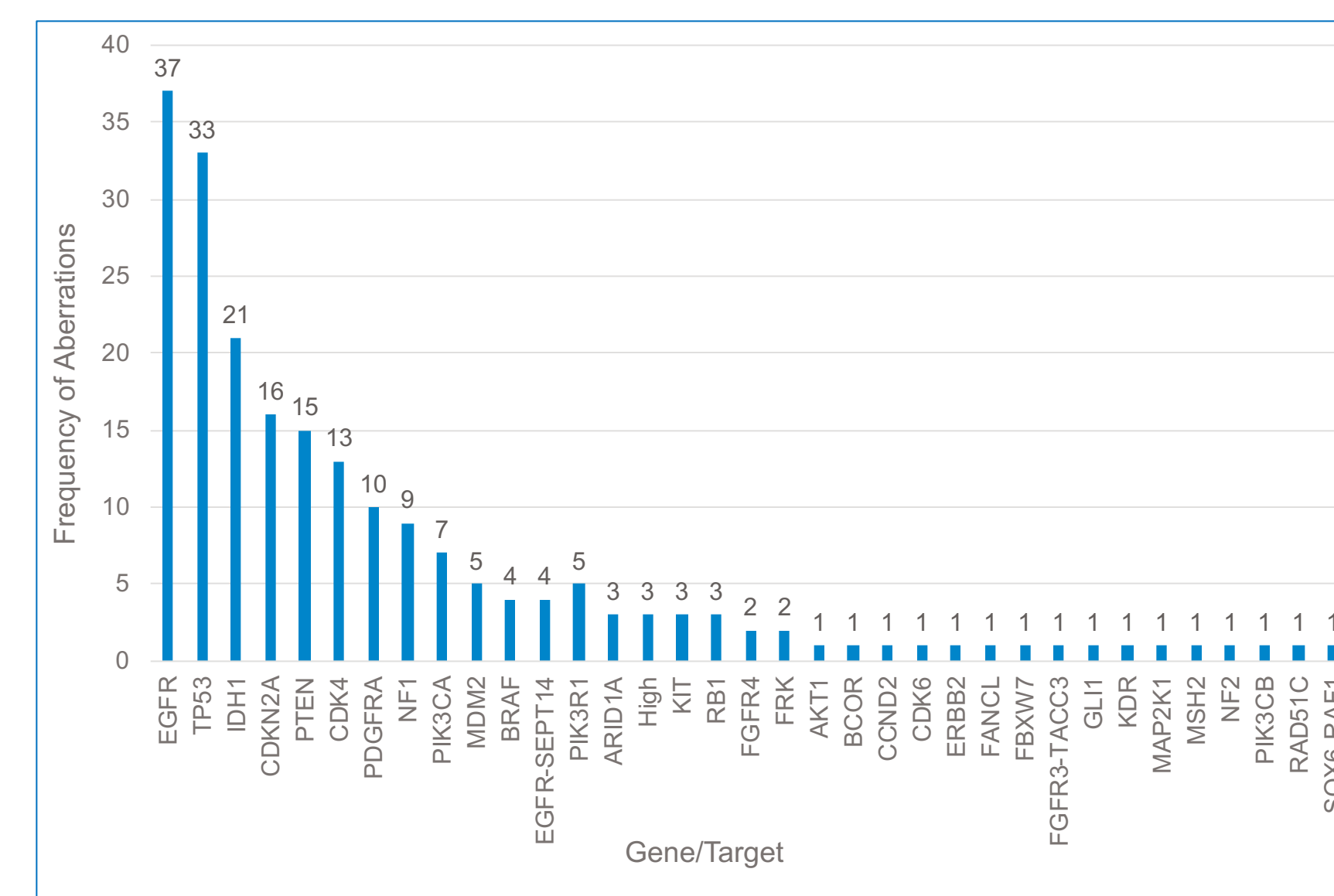


Figure 2: Frequency of mutated genes for all successful primary brain tumor GTT reports. N=89 tumors with 211 clinically significant aberrations

Frequency of Mutated Genes in Glioblastomas

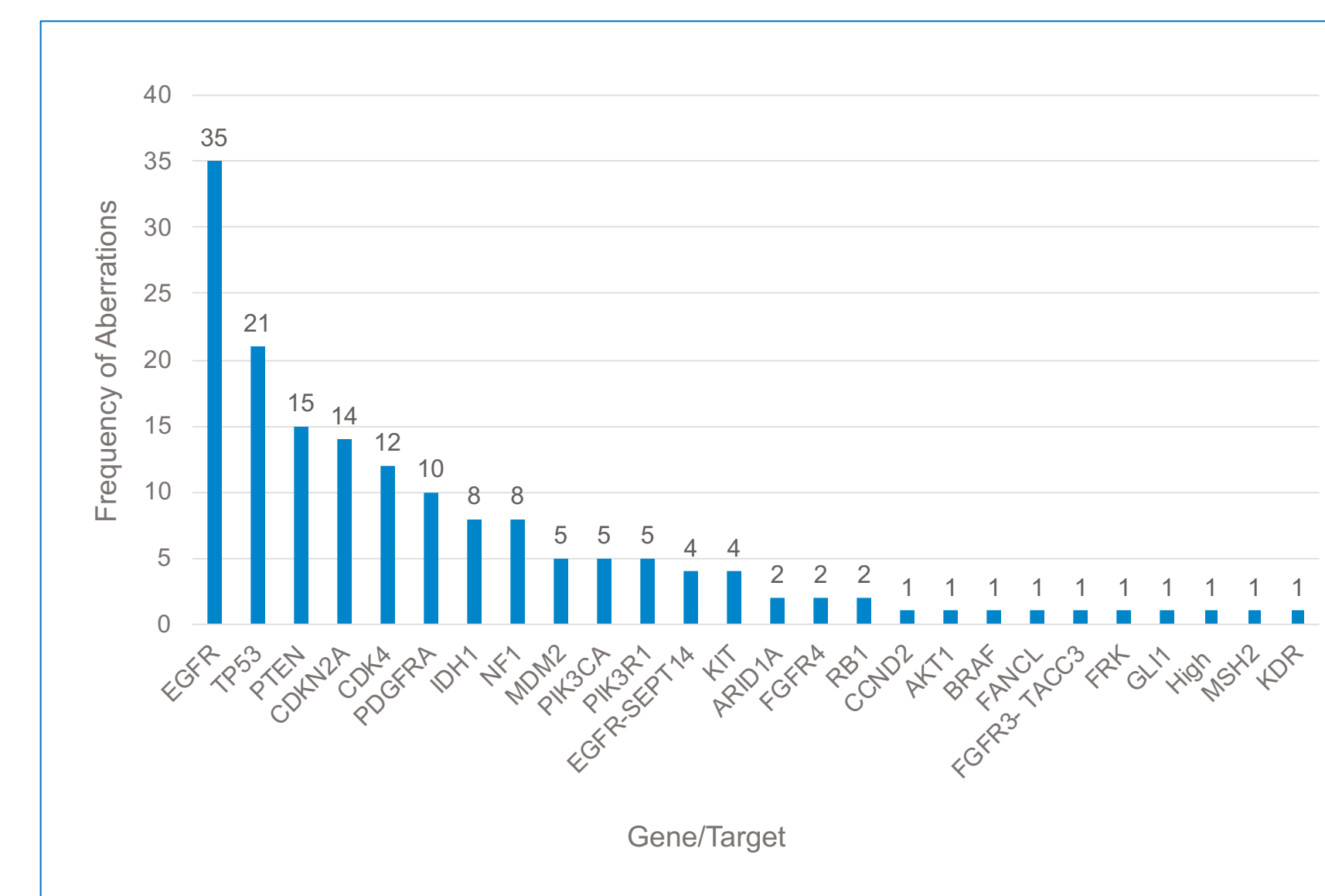


Figure 3: Frequency of mutated genes for successful GTT reports on glioblastomas. N=66 glioblastomas with 162 clinically significant aberrations

Frequency of Mutated Genes in Astrocytomas

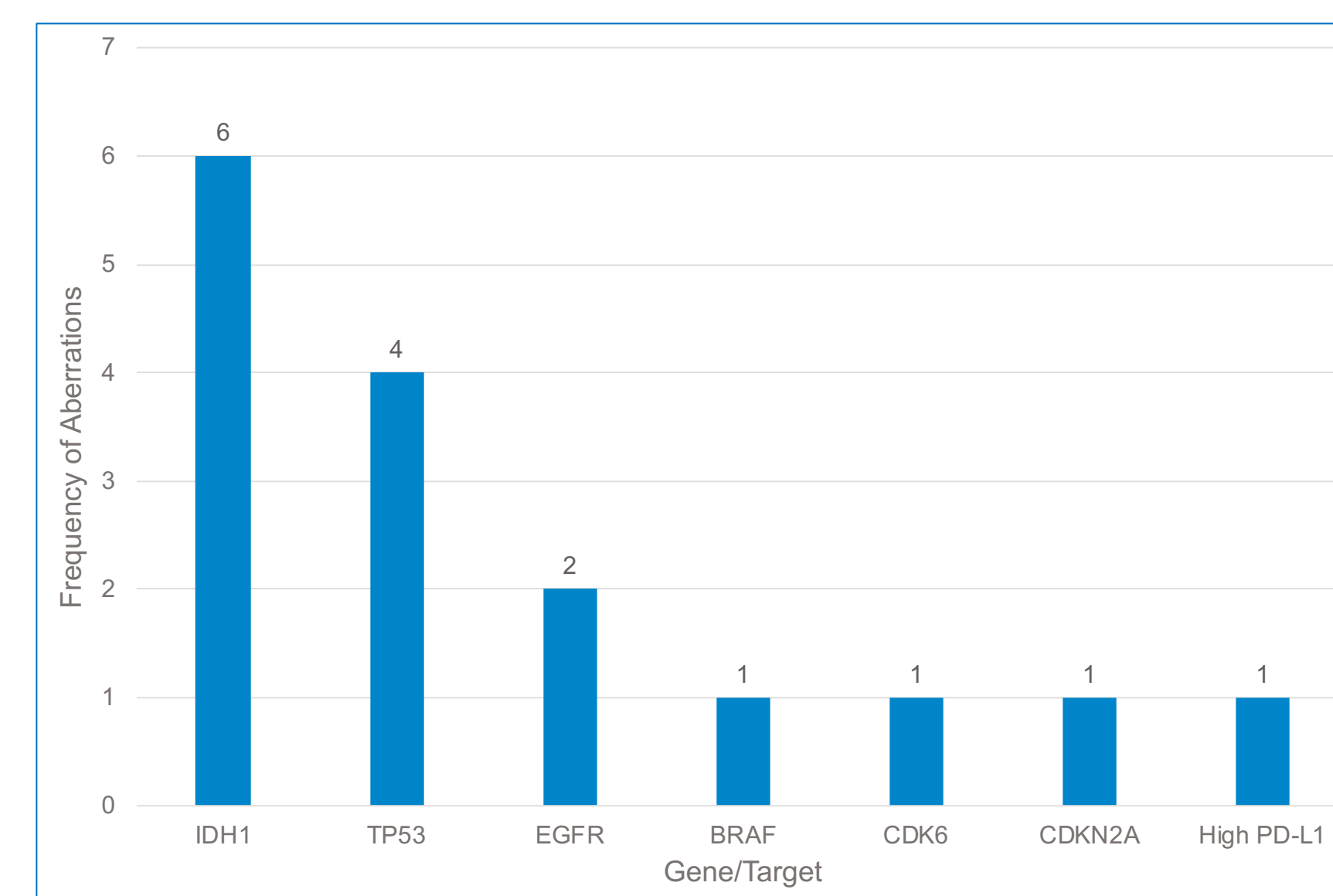


Figure 4: Frequency of mutated genes for successful GTT reports on astrocytomas. N=8 astrocytomas with 16 clinically significant aberrations.

Frequency of Mutated Genes in Oligodendrogliomas

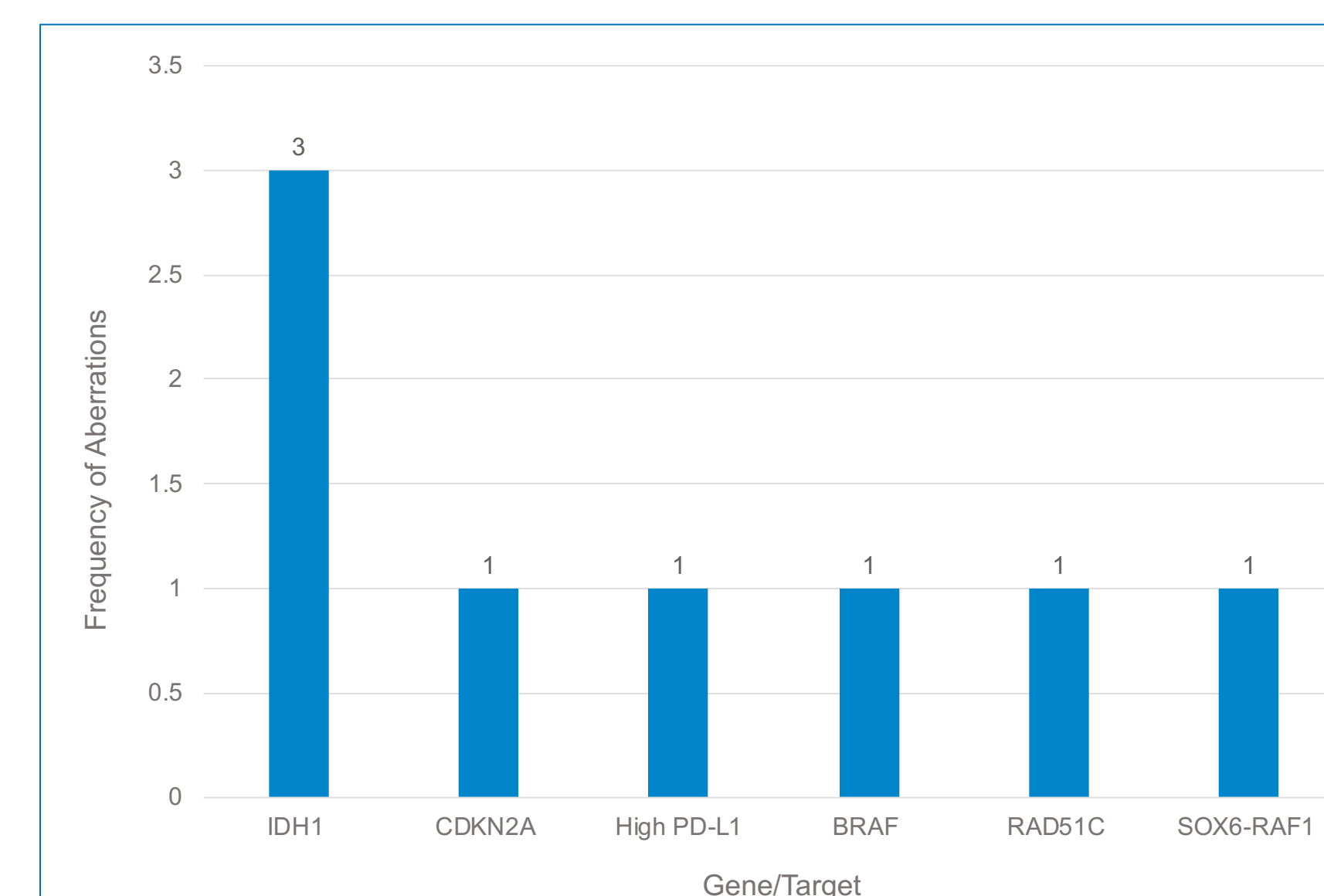


Figure 5: Frequency of mutated genes for successful GTT reports on oligodendrogliomas. N=4 oligodendrogliomas with 8 clinically actionable aberrations.

Length on Treatment for Patients with Primary Brain Tumors

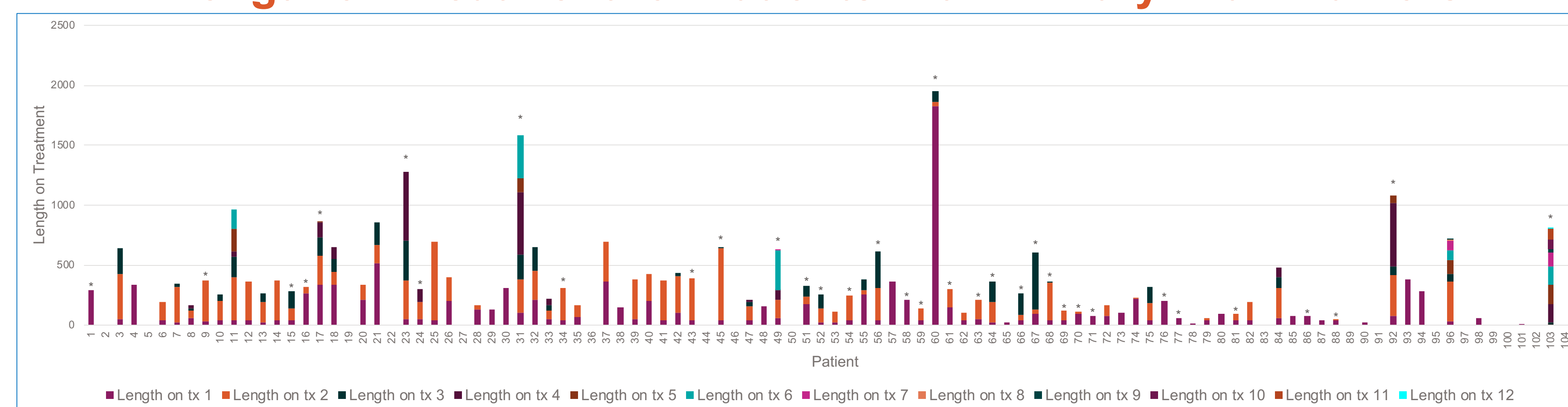


Figure 6: This graph shows the total length of time on treatment for each of the primary brain tumor patients; the range is anywhere from 0 days to over 5 years, but the average duration of each course of treatment is 142.3 days. Each column represents a single patient, and each color represents a different 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.

Treatment Data (continued)

Treatment Courses by No. of Times Occurring

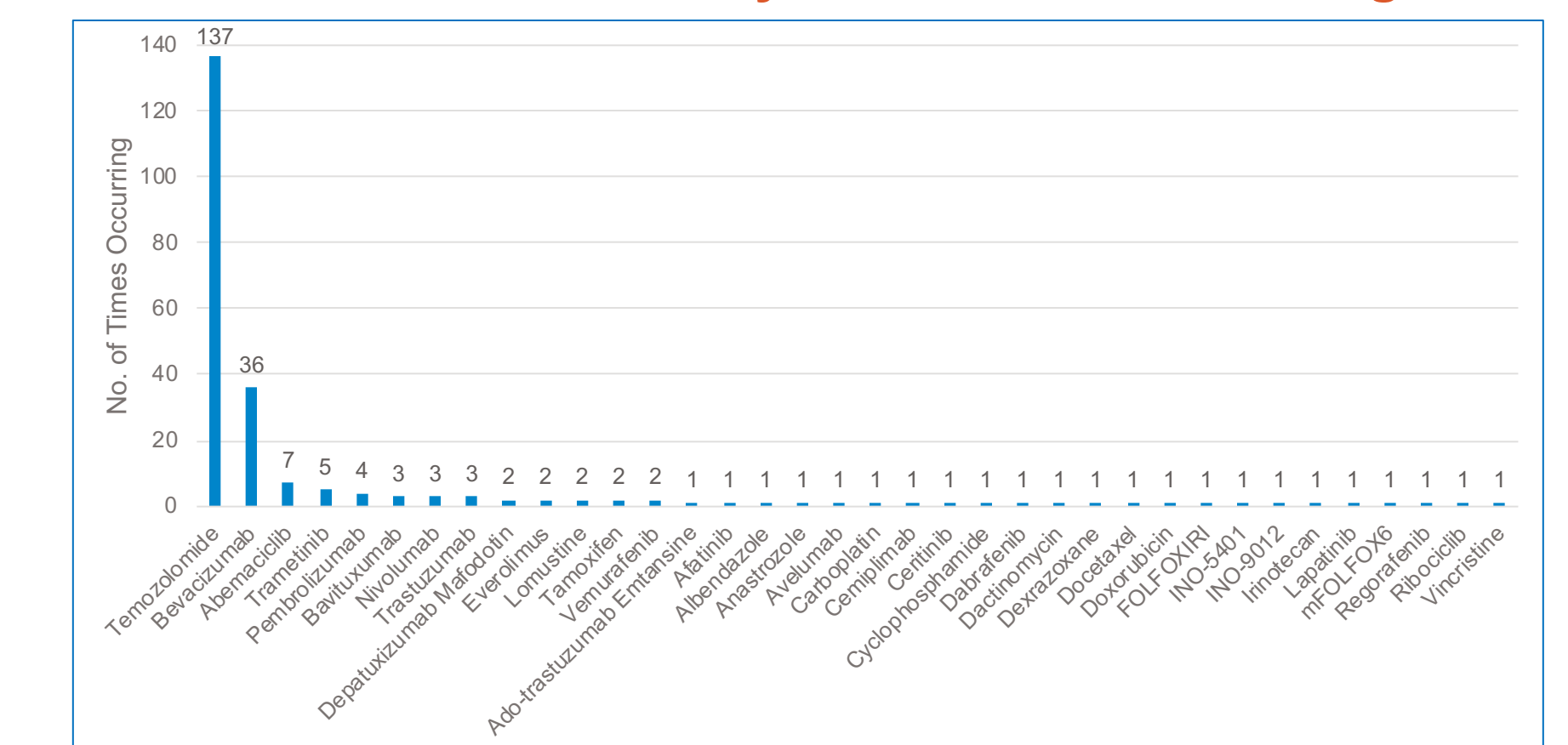


Figure 7: This figure graphs each drug by the number of times it was listed in the data as being administered as a course of treatment. This figure includes treatments which are not primary anti-cancer drugs but were entered into RedCAP Cloud nonetheless (for example, some anti-parasitics).

No. of Courses of Treatment per Patient

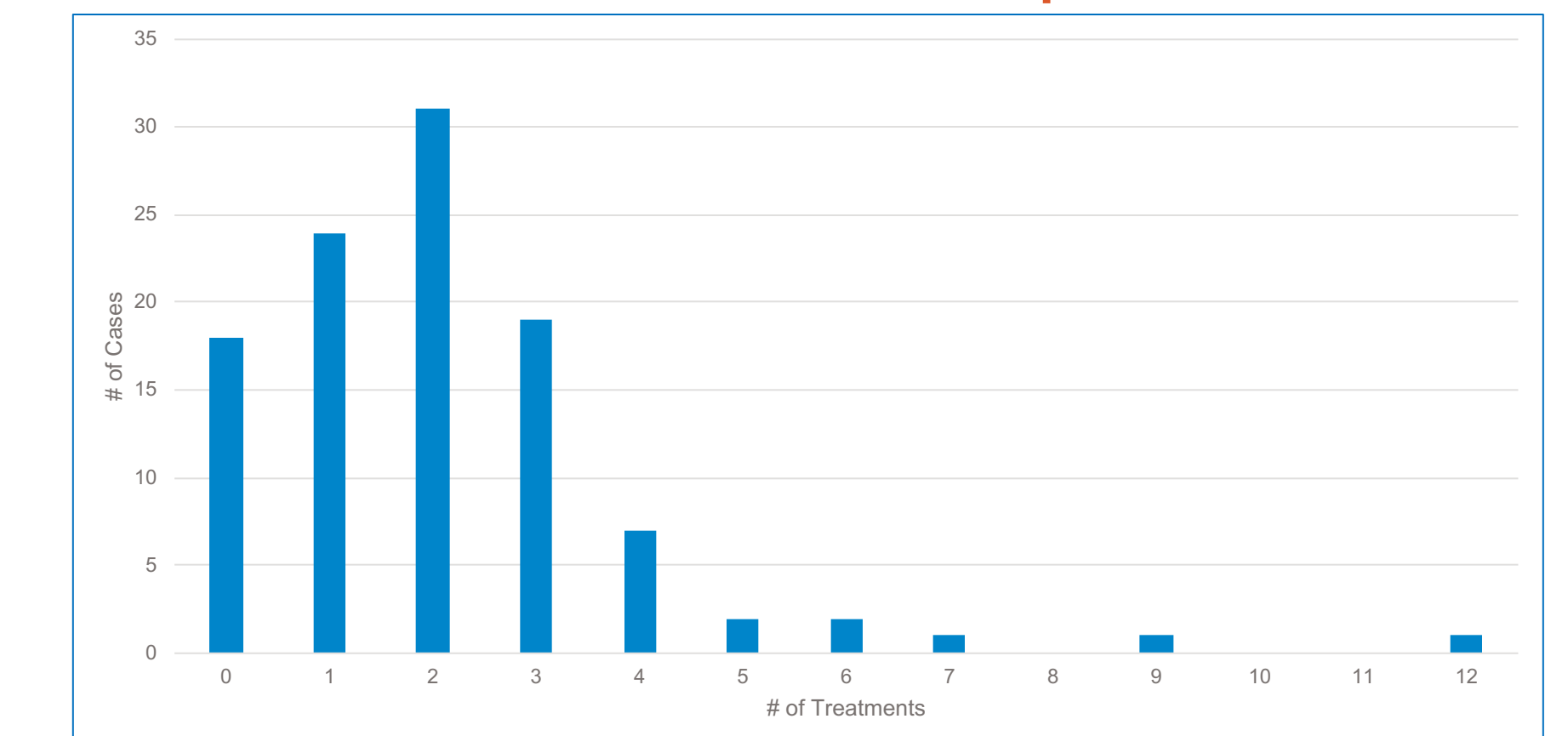


Figure 8: This figure shows the distribution of the number of treatment courses received by each brain tumor patient; the average number of treatment courses is 2.08. In reality this number is surely higher, because the MCGI does not track new treatments after the study period is over.

Treatment Duration for Patients on Targeted Therapies

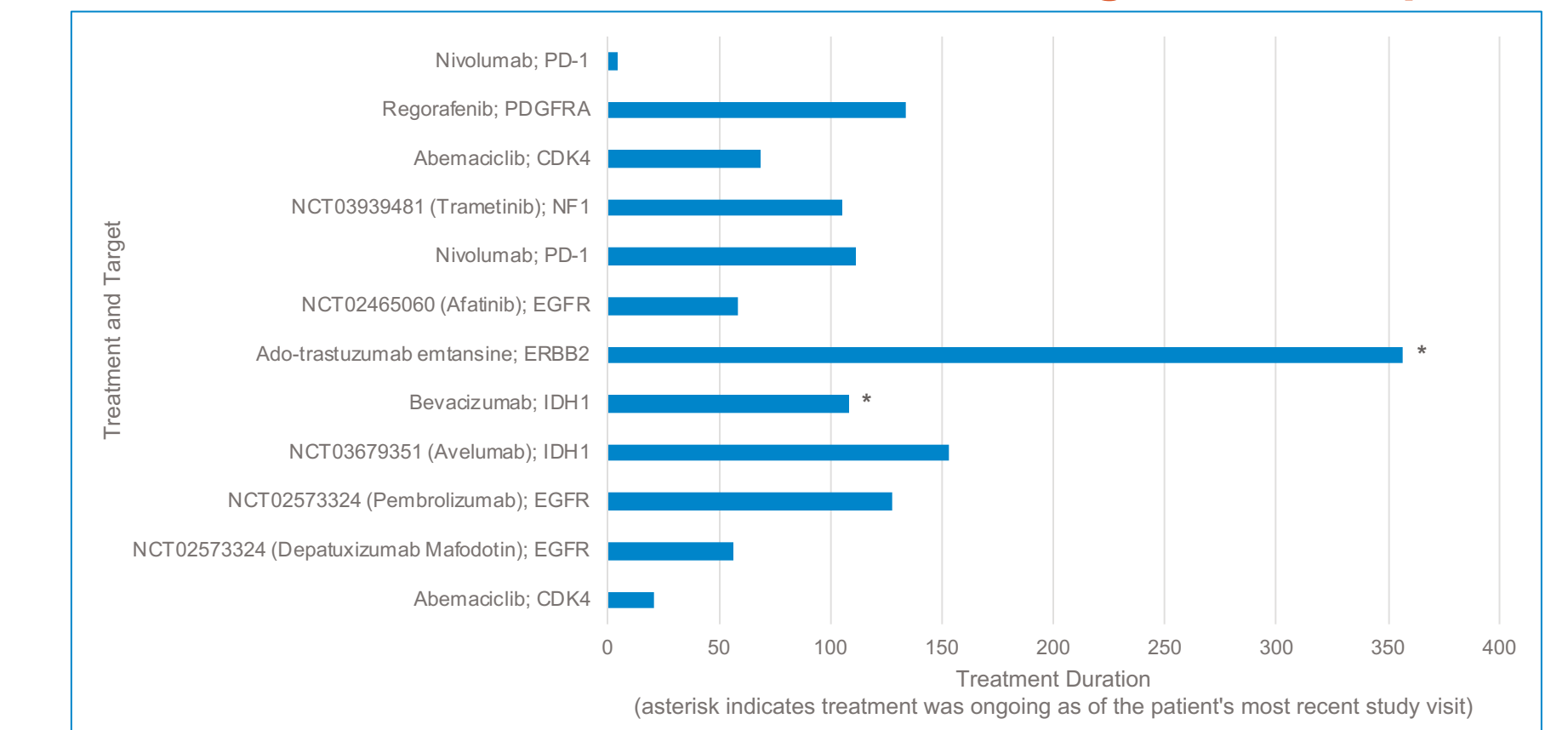


Figure 9: This figure displays the length on targeted or PD-L1 therapies for those patients who have received targeted treatments in connection with MCGI services. The graph also shows the relevant gene or protein target for that therapy. The asterisks indicate ongoing treatments.

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, GTBs, 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.