



Adrenal Cancer Case Study

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Objective:

Examine different prognostic markers and patient demographics with three common forms of adrenal cancer in order to determine which factors contribute to increased disease mortality and reduced survival time

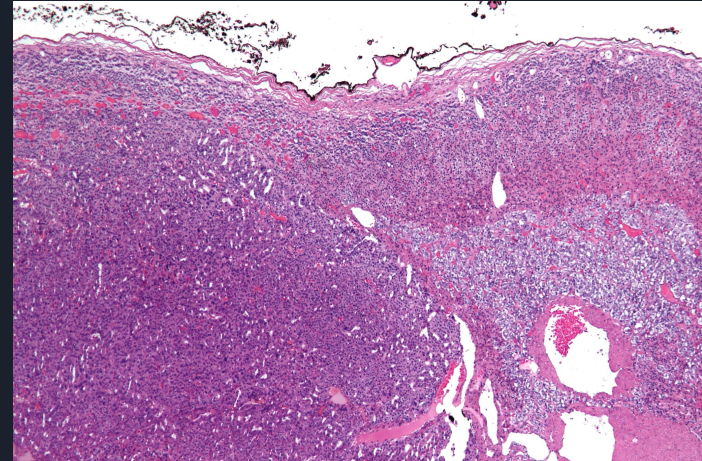
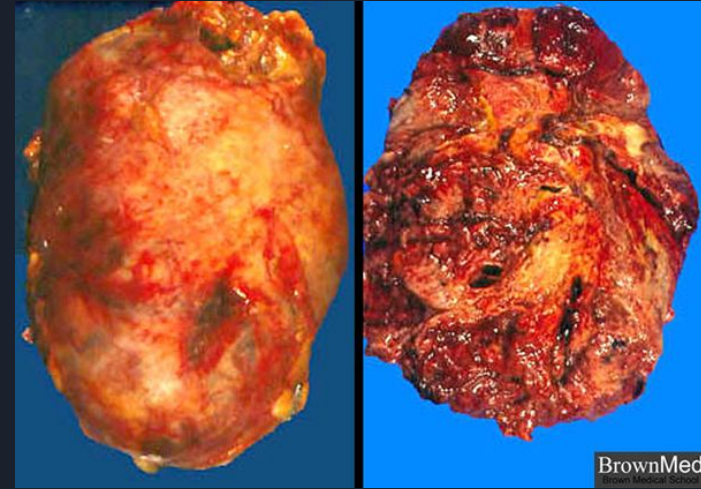


Adrenal Gland Tumors

1. Adrenocortical Carcinoma
2. Pheochromocytoma/Paraganglioma
3. Neuroblastoma

Adrenocortical Carcinoma

- Tumor that originates from the adrenal cortex.
- Most common type of adrenal cancer with common malignancy. 50% survival rate
- May overproduce hormones such as aldosterone, cortisol, estrogen and testosterone
- Symptoms: abdominal pain, hirsutism, gynecomastia, high BP, high blood sugar
- Complications: Cushing's syndrome from high cortisol production, Conn's syndrome from high aldosterone production
- Treatment: adrenalectomy



Dataset

- Published by The Cancer Genome Atlas (TCGA) in 2021
- Analyzes the tumor samples of 92 patients
- Aneuploidy Score: number of altered chromosome arms ranging from 0 to 39. High score may indicate reduced response to immunotherapy
- Mutation Count: high score may indicate tumor progression
- % Genome Altered: high % increase likelihood of malignancy
- MSI Mantis Score: measurement of microsatellite (MSI) instability that predicts likelihood of high MSI
- MSISensor Score: % indicates likelihood of MSI instability
- Tumor mutational burden (TMB): number of genetic mutations in a tumor's DNA
- Tumor break load: measure of genomic instability by adding up all unbalanced chromosomal breaks in a tumor

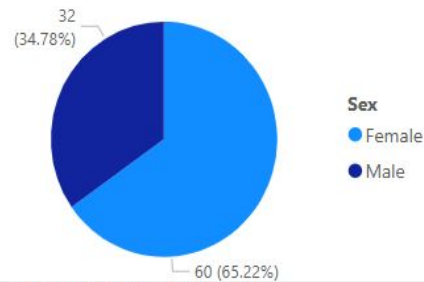
	Patient_ID	Sex	Race	Diagnosis	Age	Diagnosis Age Range	Prior Diagnosis	Aneuploidy Score	MSI_MANTIS_Score	MSISensor Score	Mutation Count
0	OR-A5J1	Male	White	58	51-70		No	2.0	0.28	0.0	23.0
1	OR-A5J2	Female	Hispanic	44	31-50		No	10.0	0.32	1.57	29.0
2	OR-A5J3	Female	Hispanic	23	14-30		No	12.0	0.34	1.82	10.0
3	OR-A5J4	Female	Hispanic	23	14-30		No	17.0	0.3	0.45	116.0
4	OR-A5J5	Male	Hispanic	30	14-30		No	33.0	0.52	5.38	354.0
5	OR-A5J6	Female	Black	29	14-30		No	22.0	0.29	0.0	30.0
6	OR-A5J7	Female	Hispanic	30	14-30		No	24.0	0.29	0.79	48.0
7	OR-A5J8	Male	Hispanic	66	51-70		No	7.0	0.32	0.64	89.0
8	OR-A5J9	Female	Hispanic	22	14-30		No	27.0	0.32	0.9	31.0
9	OR-A5JA	Female	White	53	51-70		No	33.0	0.31	0.72	477.0
10	OR-A5JB	Male	White	52	51-70		No	13.0	0.29	0.35	280.0
11	OR-A5JC	Male	White	37	31-50		No	28.0	0.3	0.56	27.0
12	OR-A5JD	Female	White	57	51-70		No	39.0	0.3	0.46	26.0
13	OR-A5JE	Female	White	17	14-30		No	21.0	0.29	0.0	52.0
14	OR-A5JF	Female	White	69	51-70		No	18.0	0.29	0.91	66.0
15	OR-A5JG	Male	White	61	51-70		No	39.0	0.32	1.45	26.0

Percent_Genome_Altered	TMB	Tumor Break Load	Overall_Survival_Months	Survival Status	Radiation Therapy	Tumor Progression or Recurrence
5.85	0.8	421.0	45.0	Dead w/ Tumor	No	Recurrence
40.33	0.97	68.0	55.0	Dead w/ Tumor	No	Recurrence
41.31	0.33	7.0	69.0	Alive w/ Tumor	No	Recurrence
92.59	3.87	474.0	14.0	Dead w/ Tumor	No	Recurrence
80.15	11.87	36.0	12.0	Dead w/ Tumor	No	Recurrence
47.85	1.0	12.0	89.0	Alive Tumor-Free	No	Neither
89.33	1.6	384.0	16.0	Dead w/ Tumor	No	Recurrence
25.28	2.97	186.0	19.0	Dead w/ Tumor	Yes	Recurrence
94.66	1.03	106.0	44.0	Alive w/ Tumor	No	Recurrence
79.04	15.77	162.0	30.0	Dead w/ Tumor	No	Progression
33.72	9.4	84.0	18.0	Alive Tumor-Free		Neither
65.36	0.9	172.0	58.0	Alive Tumor-Free		Neither
94.77	0.87	4.0	100.0	Alive Tumor-Free	No	Neither
49.1	1.73	177.0	69.0	Dead w/ Tumor	No	Recurrence
90.14	2.2	38.0	66.0	Alive Tumor-Free	Yes	Neither

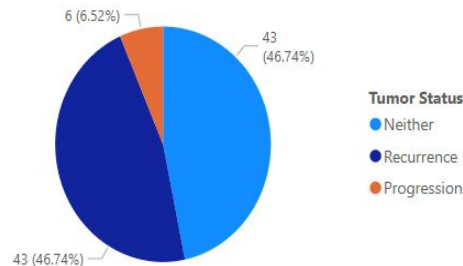
Demographics

- Dataset is mostly White
- Many instances of tumor recurrence but little progression
- Most patients are either alive tumor-free or dead from tumor
- Diagnosis age most commonly 51-70 years
- Patient prognosis will be determined by survival status and months of survival after diagnosis

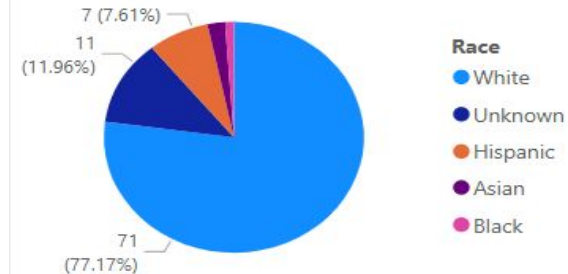
Sample Sex Distribution



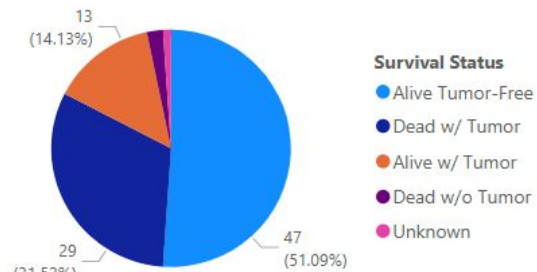
Sample Tumor Status Distribution



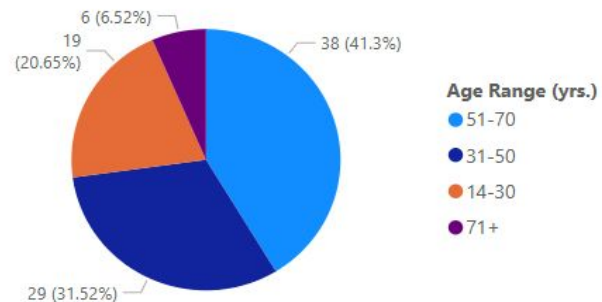
Sample Race Distribution



Sample Survival Status Distribution

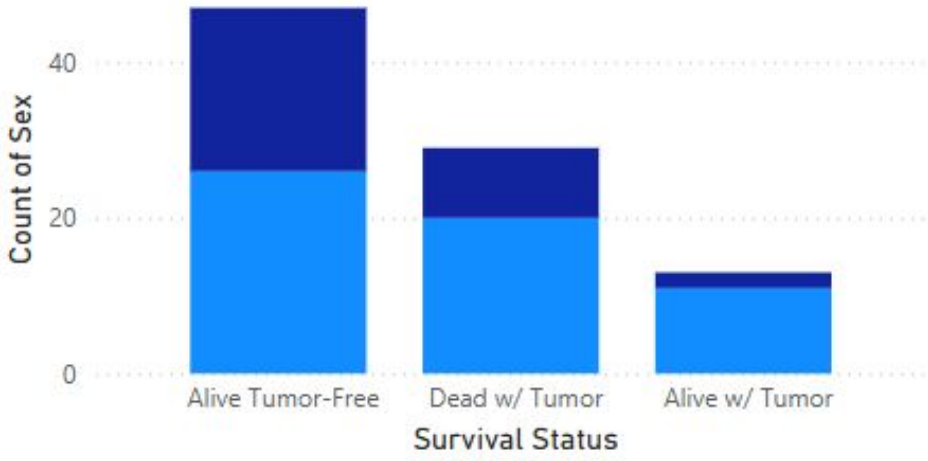


Sample Diagnosis Age Range Distribution



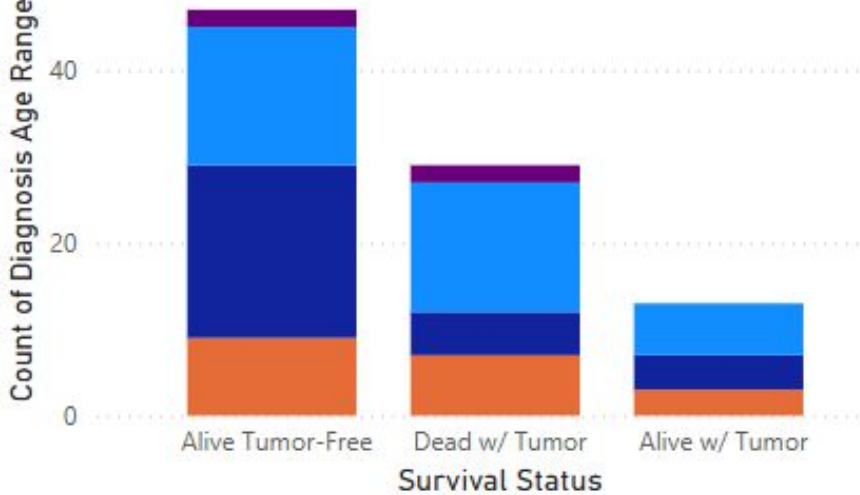
Count of Sex by Survival Status

Female Male



Count of Diagnosis Age Range (Yrs.) by Survival Status

14-30 31-50 51-70 71+



Overall_Survival_Months

mean

std

size

Sex

Female

47.135593

34.288561

60

Male

48.625000

33.815200

32

Overall_Survival_Months t-test p-value

mean

std

size

Diagnosis Age Range

14-30

46.684211

32.567968

19

-0.13

0.900

31-50

59.750000

36.350786

29

1.79

0.077

51-70

39.894737

32.079959

38

-1.49

0.140

71+

43.500000

29.432975

6

-0.35

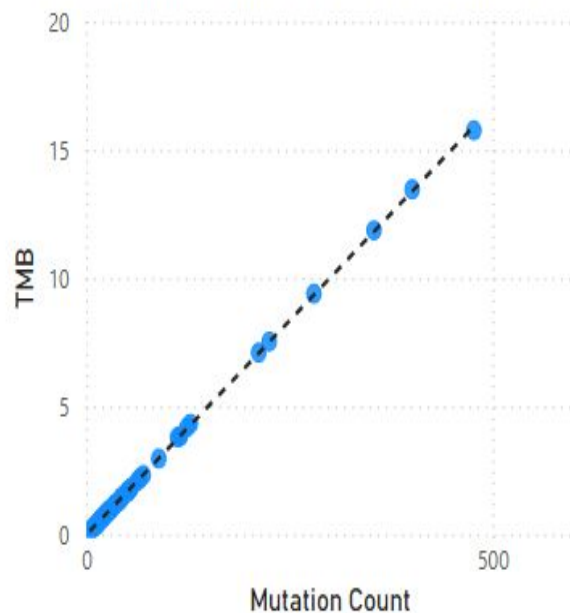
0.730

Correlation Coefficient



Mutation Count vs TMB

Points w/ mutation count > 500 removed for better viz

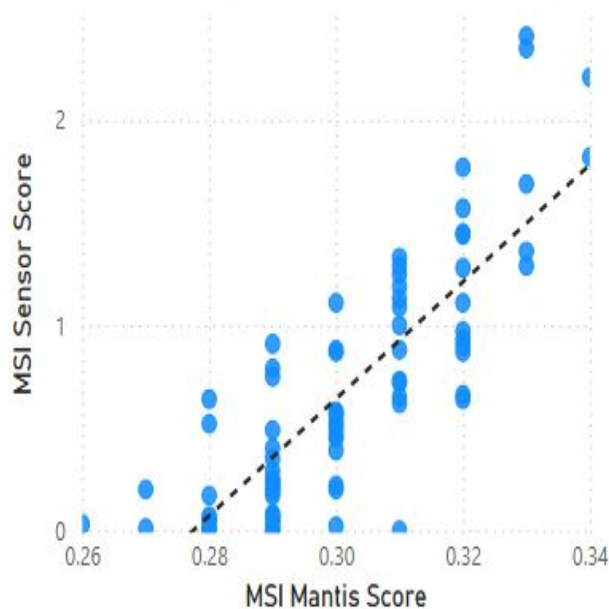


Correlation Coefficient



MSI MANTIS Score vs MSI Sensor Score

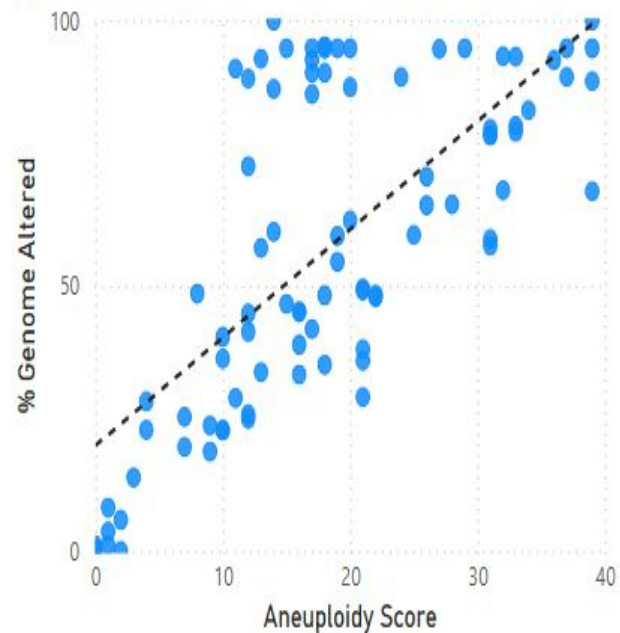
Points w/ MSI MANTIS Score > 0.4 removed for better viz



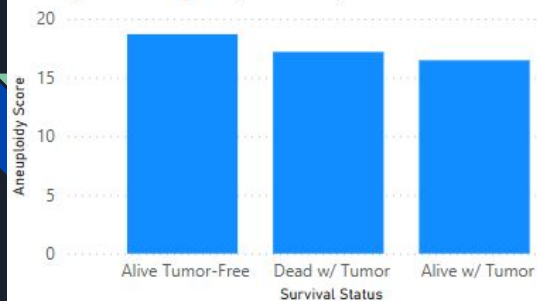
Correlation Coefficient



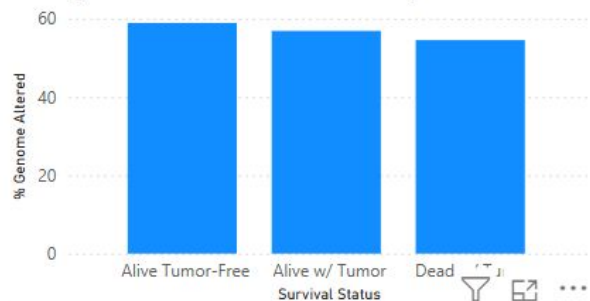
Aneuploidy Score vs Percent Genome Altered



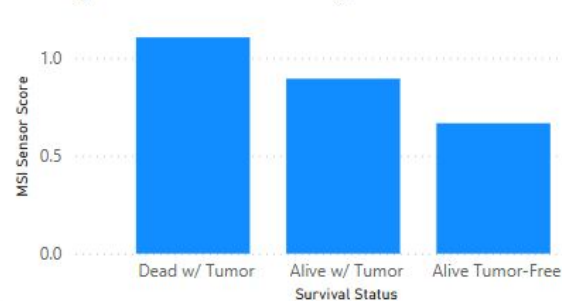
Average of Aneuploidy Score by Survival Status



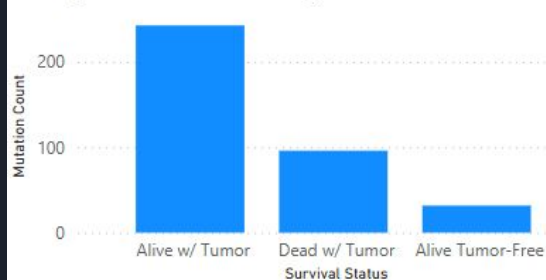
Average of Percent Genome Altered by Survival Status



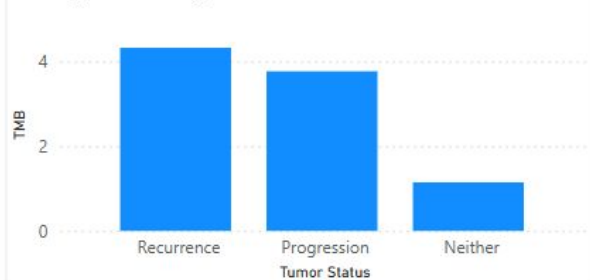
Average of MSI Sensor Score by Survival Status



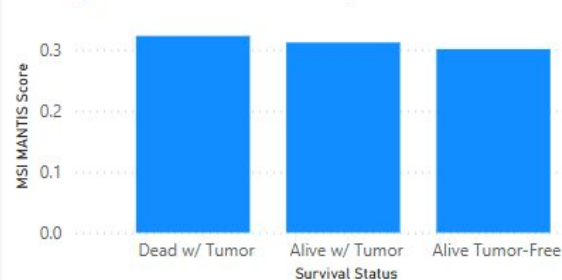
Average of Mutation Count by Survival Status



Average of TMB by Tumor Status



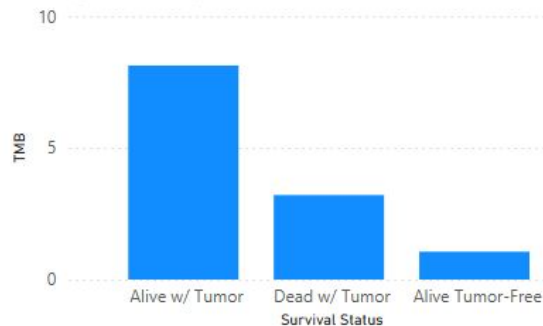
Average of MSI MANTIS Score by Survival Status



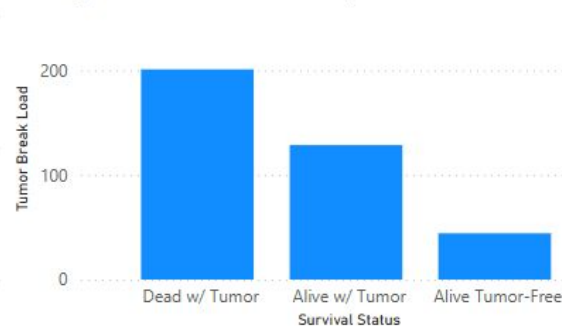
Average of Mutation Count by Tumor Status



Average of TMB by Survival Status



Average of Tumor Break Load by Survival Status



Analysis

- No significant variance in survival length based on sex or diagnosis age range. Diagnosis age 31-50 has a slightly higher survival length
- Mutation Count and TMB and MSI Mantis Score and MSISensor Score are highly positively correlated
- Aneuploidy Score and Percent Genome Altered are moderately positively correlated
- Tumor Break Load is significantly different between alive w/o tumor, alive w/ tumor and dead w/ tumor
- Mutation count and TMB are significantly different between alive w/o tumor and dead w/ tumor

	Mutation Count		Percent_Genome_Altered		Aneuploidy Score		
	mean	std	mean	std	mean	std	size
Survival Status							
Alive Tumor-Free	31.717391	48.994178	58.924222	33.309868	18.688889	11.367462	47
Alive w/ Tumor	242.538462	549.536716	56.901538	31.290767	16.461538	9.700648	13
Dead w/ Tumor	96.000000	118.748835	54.540000	27.428044	17.178571	9.185551	29

	MSI_MANTIS_Score		MSIsensor Score		Tumor Break Load		TMB		
	mean	std	mean	std	mean	std	mean	std	size
Survival Status									
Alive Tumor-Free	0.300870	0.016974	0.666087	0.649121	44.244444	49.711511	1.059783	1.643193	47
Alive w/ Tumor	0.311538	0.050637	0.893846	1.250617	128.615385	86.580924	8.132308	18.447072	13
Dead w/ Tumor	0.322414	0.071497	1.104828	1.678066	201.000000	185.688110	3.209655	3.959029	29

	Mutation Count ttest/p-value	Percent Genome Altered ttest/p-value	Aneuploidy Score ttest/p-value	MSI Mantis Score ttest/p-value	MSISensor Score ttest/p-value	Tumor Break Load ttest/p-value	TMB ttest/pvalue
Alive w/ Tumor vs Alive Tumor-Free	1.38/0.10	-0.20/0.58	-0.71/0.76	0.05/0.48	0.61/0.28	3.36/<0.01	1.38/0.10
Dead w/ Tumor vs Alive w/ Tumor	-0.95/0.82	-0.23/0.59	0.23/0.41	0.32/0.38	0.46/0.32	1.72/0.046	-0.95/0.82
Dead w/ Tumor vs Alive Tumor-Free	2.773/<0.01	-0.62/0.73	-0.63/0.74	1.64/0.056	1.33/0.096	4.45/<0.01	2.78/<0.01

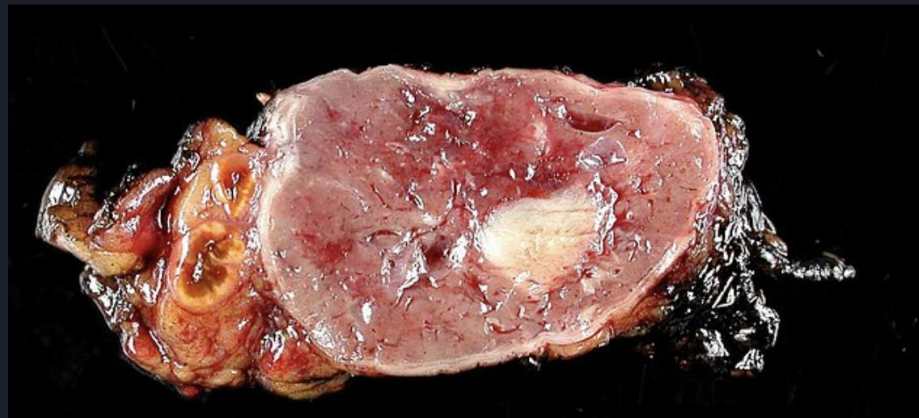
Pheochromocytoma vs Paraganglioma

Pheochromocytoma

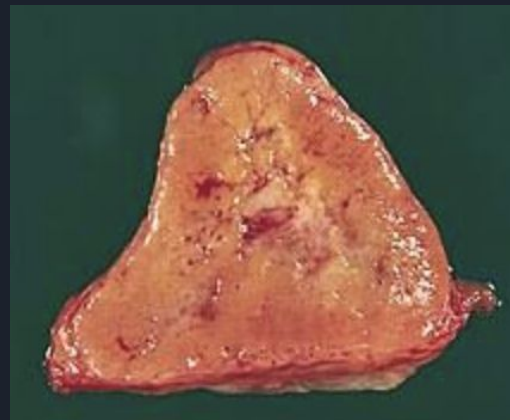
- Most common adrenal medulla tumor in adults derived from chromaffin cells of neural crest. Can cause overproduction of dopamine, norepinephrine, epinephrine and EPO
- Symptoms: hyperadrenergic sx of increased BP, headaches, sweating, increased HR and pallor
- Mostly benign. Extra-adrenal, bilateral and/or malignant around 10% of the time.
- Treatment: alpha-antagonists followed by beta blockers

Paraganglioma

- Neuroendocrine tumor also derived from chromaffin cells. Located near blood vessels and nerves around the body
- Symptoms: asymptomatic or same sx as pheochromocytoma
- Mostly benign, but higher chance of malignancy than pheochromocytoma due to its anatomic location
- Treatment: surgery or same tx as pheochromocytoma



Pheochromocytoma



Paraganglioma

Dataset

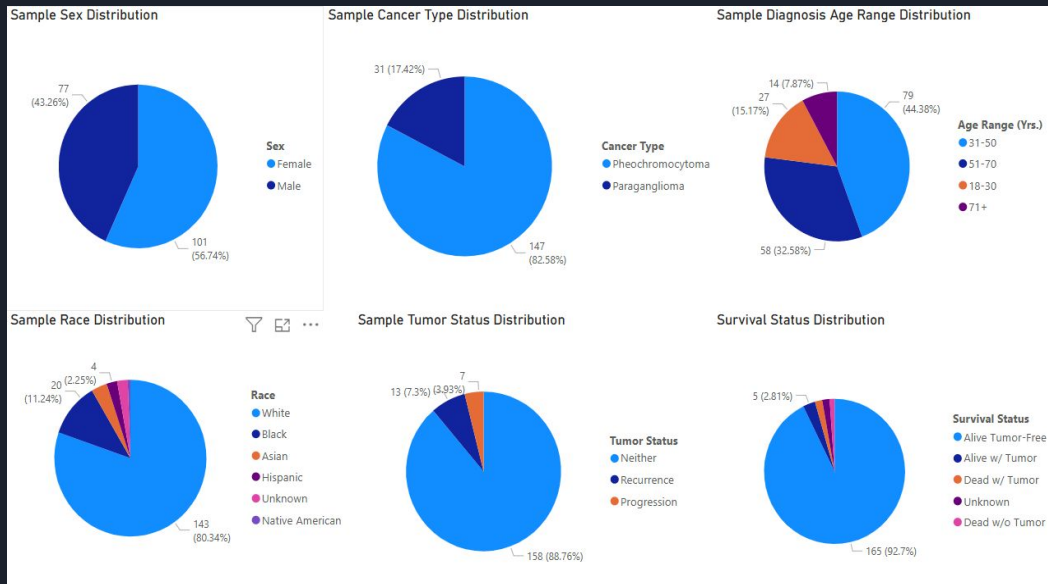
- Published by the Cancer Genome Atlas in 2013
- Analyzes pheochromocytoma and paraganglioma tumor samples of 178 patients
- Same diagnostic measures as adrenocortical carcinoma dataset
- Hypoxia Score: calculates the gene expression of hypoxia to estimate how much hypoxia is present in a patient. Buffa, Ragnum and Winter scores specifically measure hypoxia in tumors

Patient_ID	Cancer Type Detailed	Sex	Race	Diagnosis Age	Diagnosis Age Range	Prior Diagnosis	Aneuploidy Score	Buffa Hypoxia Score	Ragnum Hypoxia Score	Winter Hypoxia Score
0	P7-ASNX	Pheochromocytoma	Female	Hispanic	78	71	No	-19	-20	-34
1	P7-ASNY	Pheochromocytoma	Female	White	21	18-30	Yes	-19	-10	-36
2	P8-ASKC	Pheochromocytoma	Male	White	48	31-50	No	-21	-26	-46
3	P8-ASKD	Pheochromocytoma	Female	White	35	31-50	No	-33	-14	-44
4	P8-ABRX	Paraganglioma	Male	White	65	51-70	No	13	-8	-18
5	P8-ABRY	Pheochromocytoma	Male	White	55	51-70	No	-23	-22	-40
6	PR-ASPF	Pheochromocytoma	Female	White	62	51-70	No	-19	-22	-40
7	PR-ASPG	Pheochromocytoma	Female	White	42	31-50	No	-23	-16	-34
8	PR-ASPH	Pheochromocytoma	Male	White	47	31-50	No	-21	-22	-44
9	QR-A6GO	Pheochromocytoma	Male	White	43	31-50	No	-15	-18	-16
10	QR-A6GR	Pheochromocytoma	Female	White	30	18-30	No	-9	-24	-18
11	QR-A6GS	Pheochromocytoma	Female	White	51	51-70	No	-33	-24	-38
12	QR-A6GT	Pheochromocytoma	Female	White	63	51-70	No	-1	-16	-6
13	QR-A6GU	Pheochromocytoma	Male	White	31	31-50	No	-13	-16	-32
14	QR-A6GW	Pheochromocytoma	Female	White	53	51-70	No	-11	-18	-22
15	QR-A6GX	Pheochromocytoma	Female	Black	28	18-30	No	-17	-18	-36
16	QR-A6GY	Pheochromocytoma	Female	White	37	31-50	No	-13	-20	-24
17	QR-A6GZ	Pheochromocytoma	Male	White	31	31-50	Yes	13	-10	-2
18	QR-A6H0	Paraganglioma	Male	White	53	51-70	No	-13	-22	-32
19	QR-A6H1	Pheochromocytoma	Male	White	55	51-70	Yes	-5	-18	-22
20	QR-A6H2	Pheochromocytoma	Male	Asian	33	31-50	No	-7	-20	-10

MSI_MANTIS_Score	MSIsensor Score	Mutation Count	Percent_Genome_Altered	TMB	Tumor Break Load	Overall_Survival_Months	Survival Status	Radiation Therapy	Tumor Progression or Recurrence
0.35	0.0	17		0.57	45.0	27.0	Alive Tumor-Free	No	Neither
0.36	0.03	6	7.51	0.2	2.0	31.0	Alive Tumor-Free	No	Neither
0.32	0.02	11	0.04	0.73	20.0	29.0	Alive Tumor-Free	No	Neither
0.33	0.0	7	21.75	0.47	4.0	4.0	Alive Tumor-Free	No	Neither
0.36	0.06	20	23.55	0.67	20.0	18.0	Alive Tumor-Free	No	Neither
0.32	0.0	4	5.71	0.13	0.0	6.0	Alive Tumor-Free	No	Neither
0.36	0.02	16	20.69	0.53	43.0	18.0	Alive Tumor-Free	No	Neither
0.37	0.03	15	13.6	0.5	9.0	82.0	Alive Tumor-Free	No	Recurrence
0.36	0.0	8	7.25	0.27	29.0	28.0	Alive Tumor-Free	No	Neither
0.36	0.0	11	10.7	0.37	7.0	35.0	Alive Tumor-Free	No	Neither
0.31	0.0	12	6.49	0.37	59.0	23.0	Alive Tumor-Free	No	Neither
0.32	0.0	9	7.2	0.3	37.0	1.0	Alive Tumor-Free	No	Neither
0.33	0.04	24	20.96	0.83	3.0	138.0	Alive w/ Tumor	No	Recurrence
0.32	0.02	17	12.06	0.57	4.0	59.0	Alive Tumor-Free	No	Neither
0.35	0.06	16		0.53		16.0	Alive Tumor-Free	No	Neither
0.35	0.02	12	44.2	0.4	6.0	19.0	Alive Tumor-Free	No	Neither
0.36	0.03	16	11.13	0.53	17.0	1.0	Alive Tumor-Free	No	Neither
0.34	0.0	4	12.23	0.13	15.0	31.0	Alive Tumor-Free	No	Neither
0.32	0.0	4	6.79	0.13	2.0	9.0	Alive Tumor-Free	No	Neither
0.32	0.0	14	12.86	0.47	5.0	14.0	Alive Tumor-Free	No	Neither
0.33	0.0	8	5.37	0.27	6.0	10.0	Alive Tumor-Free	No	Neither

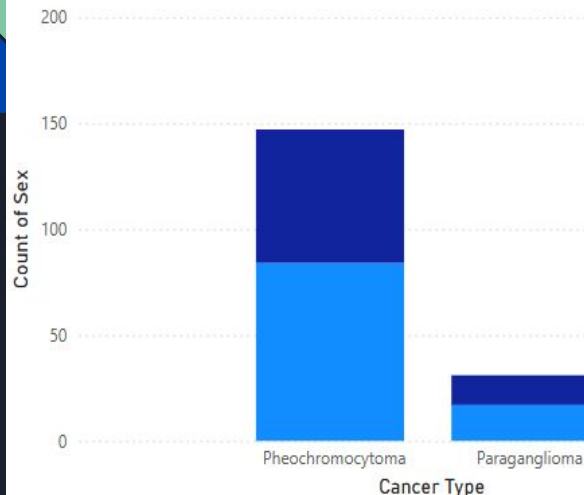
Demographics

- Dataset is mostly White
- Most patients do not experience tumor recurrence or progression and end up alive tumor-free.
- Relatively even distribution of sex.
- Most pt's are between 51-70 years old
- Since survival and tumor status are skewed in sample population, pheochromocytoma vs paraganglioma will be assessed to determine patient prognosis
- Paraganglioma considered deadlier than pheochromocytoma due to its higher chance of metastasis



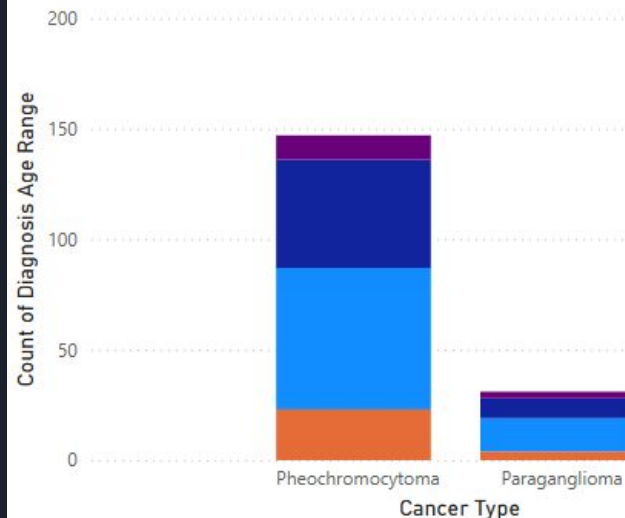
Count of Sex by Cancer Type

Female Male



Count of Diagnosis Age Range (Yrs.) by Cancer Type

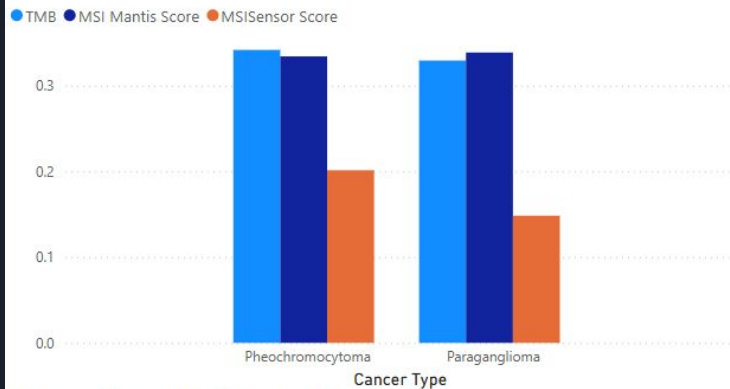
18-30 31-50 51-70 71+



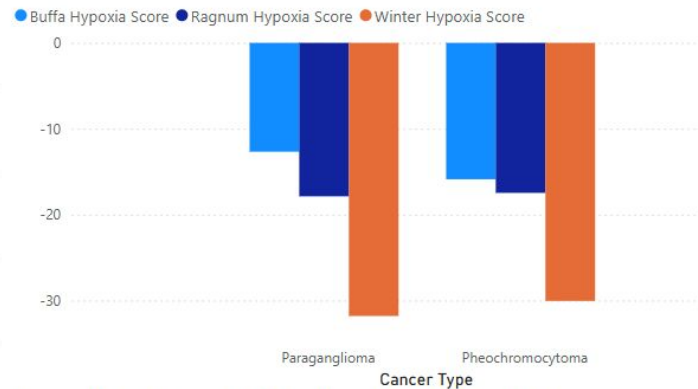
	Female	Male
Proportion of Paraganglioma	16.8%	18.2%
Size	101	77

	18-30	31-50	51-70	71+
Percentage of Paraganglioma	17.4%	19%	15.52%	27.3%
Size	27	79	58	14
Paraganglioma vs Pheochromocytoma Z-test	-0.004	-0.363	-0.674	0.793
p-value	0.5	0.64	0.75	0.21
Statistically Significant?	No	No	No	No

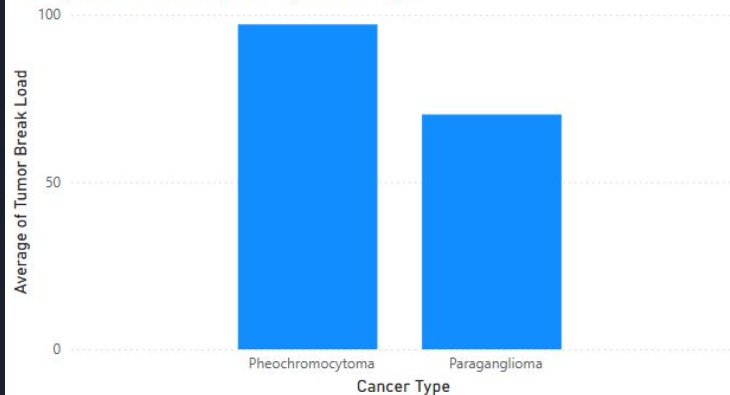
Average MSI Sensor Score, TMB and MSI Mantis Score by Cancer Type



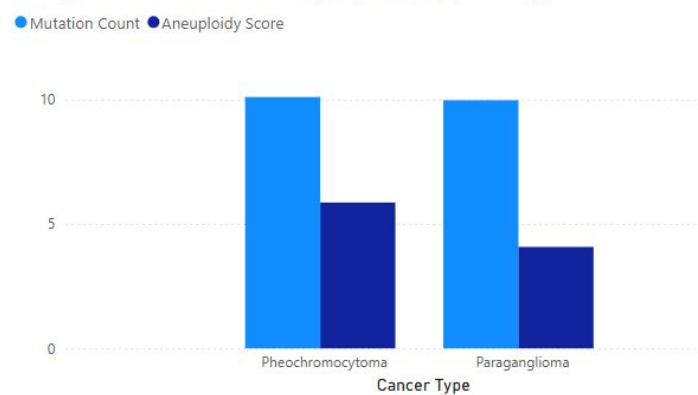
Average Hypoxia Scores Based on Cancer Type



Average of Tumor Break Load by Cancer Type



Average Mutation Count and Aneuploidy Score by Cancer Type



Analysis

- No significant variance in sex or diagnosis age range between paraganglioma and pheochromocytoma
- Percent Genome Altered and Aneuploidy Score is almost significantly lower in paraganglioma compared to pheochromocytoma.
- No statistically significant difference between pheochromocytoma and paraganglioma in regards to mutation count, MSI MANTIS Score, MSIsensor score, tumor break load, TMB and Buffa, Ragnum and Winter Hypoxia Scores

	Mutation Count		Percent_Genome_Altered		Aneuploidy Score		MSI_MANTIS_Score		MSIsensor Score		
	mean	std	mean	std	mean	std	mean	std	mean	std	size
Cancer Type Detailed											
Paraganglioma	9.967742	5.480170	11.451111	7.508529	4.074074	2.540835	0.338710	0.018210	0.014839	0.023787	31
Pheochromocytoma	10.095238	5.531149	16.559104	14.838975	5.857143	5.484334	0.334218	0.015916	0.020136	0.036621	147

	Tumor Break Load		TMB		Buffa Hypoxia Score		Ragnum Hypoxia Score		Winter Hypoxia Score		
	mean	std	mean	std	mean	std	mean	std	mean	std	size
Cancer Type Detailed											
Paraganglioma	70.161290	165.519605	0.329355	0.183538	-12.677419	11.052563	-17.870968	4.410154	-31.806452	11.504838	31
Pheochromocytoma	97.075342	334.951342	0.341769	0.187433	-15.884354	11.189842	-17.469388	4.196062	-30.054422	12.872282	147

	Mutation Count	Percent Genome Altered	Aneuploidy Score	MSI Mantis Score	MSIsensor Score	Tumor Break Load	TMB	Buffa Hypoxia Score	Ragnum Hypoxia Score	Winter Hypoxia Score
Paraganglioma vs Pheochromocytoma t-test	-0.12	-1.86	-1.8	1.39	-0.72	-0.44	-0.27	1.45	-0.48	-0.7
p-value	0.91	0.064	0.08	0.165	0.47	0.66	0.79	0.15	0.63	0.48
Statistically Significant?	No	~No	~No	No	No	No	No	No	No	No

Neuroblastoma

- Most common tumor of adrenal medulla in children that originates from neural crest cells
- Symptoms: abdominal distension and mass that crosses midline, unlike Wilms tumor, opsoclonus-myoclonus syndrome
- Poor prognosis w/ earlier diagnosis having a higher chance of survival
- Treatment: Surgery and chemotherapy



Dataset

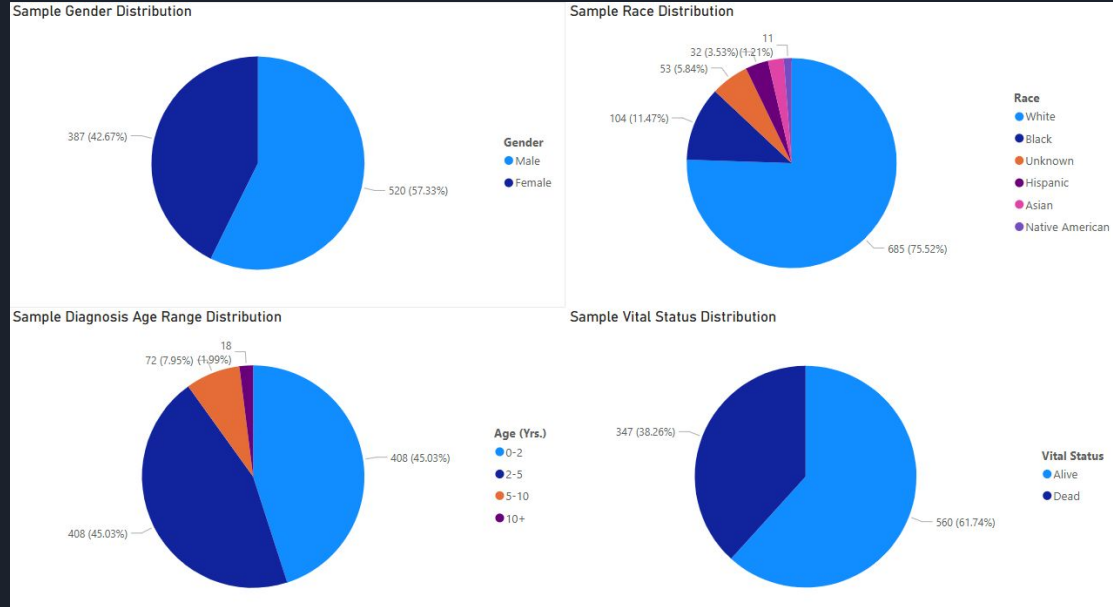
- Published by Therapeutically Applicable Research to Generate Effective Treatments (TARGET) program by National Cancer Institute in 2015
- Contains 907 tumor samples of patients
- MYCN Status: determines the amplification/ expression of MYCN gene in neuroblastomas
- Diploid or Hyperdiploid: Diploid has a normal 2 sets of chromosomes, whereas hyperdiploid indicates an abnormal higher number of chromosomes
- Histology: Favorable histology has normal looking tissue under microscope, unfavorable has abnormal tissue
- MKI: number of mitotic nuclei and karyorrhectic nuclei per 5,000 neuroblastic cells. Higher number indicates a more aggressive tumor

	target_usi	Gender	Nationality	Age at Diagnosis in Weeks	Diagnosis Age Range in Years	Year of Diagnosis	Year of Last Follow Up
12	PADFLI	Male	White	80.0	0-2	1991	1999.0
15	PADIHC	Male	White	274.0	5-10	1992	2005.0
16	PADINC	Male	Black	143.0	2-5	1992	1993.0
17	PADIRB	Female	Unknown	170.0	2-5	1992	2003.0
20	PADKGF	Male	White	79.0	0-2	1992	2000.0
21	PADKNE	Female	White	250.0	2-5	1993	1994.0
22	PADKRU	Female	White	204.0	2-5	1993	1994.0
24	PADKXS	Female	White	93.0	0-2	1993	1994.0
25	PADKYP	Male	White	246.0	2-5	1993	1996.0
26	PADLDA	Male	White	656.0	10	1993	1995.0
27	PADLDT	Female	White	115.0	2-5	1993	1993.0
28	PADLES	Female	White	255.0	2-5	1993	1996.0
29	PADLIC	Male	White	262.0	5-10	1993	2006.0
31	PADLKJ	Male	White	111.0	2-5	1993	1998.0
32	PADLNM	Male	Hispanic	135.0	2-5	1993	1994.0
33	PADLPR	Male	Black	115.0	2-5	1993	1994.0
35	PADLTD	Female	Hispanic	136.0	2-5	1993	1994.0
37	PADMTD	Male	White	149.0	2-5	1993	2002.0
39	PADMXD	Male	White	155.0	2-5	1993	1999.0
40	PADMYD	Male	White	218.0	2-5	1993	1994.0

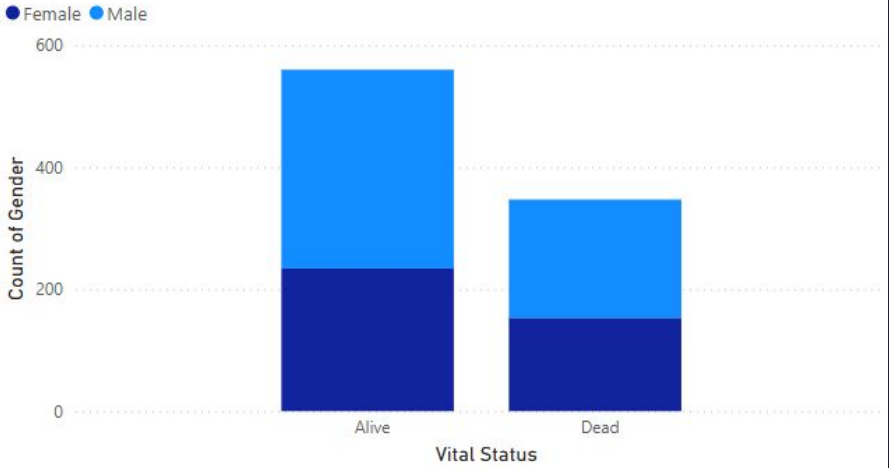
MYCN status	Diploid or Hyperdiploid	Histology	Tumor_Grade	MKI	Survival Time in Weeks	Vital Status
Not Amplified	Unknown	Unfavorable	3-4	High	410.0	Alive
Not Amplified	Unknown	Unfavorable	3-4	Low	657.0	Alive
Amplified	Unknown	Unfavorable	3-4	Low	59.0	Dead
Not Amplified	Unknown	Unfavorable	3-4	Low	551.0	Alive
Not Amplified	Unknown	Unfavorable	3-4	High	378.0	Alive
Amplified	Unknown	Unfavorable	3-4	High	84.0	Dead
Not Amplified	Unknown	Unfavorable	3-4	Intermediate	89.0	Dead
Amplified	Unknown	Unfavorable	3-4	Low	49.0	Dead
Amplified	Unknown	Unfavorable	3-4	High	155.0	Dead
Not Amplified	Unknown	Unfavorable	3-4	Low	113.0	Dead
Amplified	Unknown	Unfavorable	3-4	Intermediate	2.0	Dead
Not Amplified	Unknown	Unfavorable	3-4	Intermediate	192.0	Dead
Not Amplified	Unknown	Unfavorable	3-4	High	667.0	Alive
Amplified	Unknown	Unknown	Unknown	Unknown	250.0	Alive
Amplified	Unknown	Unfavorable	3-4	High	65.0	Dead
Not Amplified	Unknown	Unfavorable	3-4	Low	63.0	Dead
Amplified	Unknown	Unfavorable	3-4	Intermediate	68.0	Dead
Amplified	Unknown	Unfavorable	3-4	High	462.0	Alive
Amplified	Unknown	Unfavorable	3-4	High	293.0	Alive
Not Amplified	Unknown	Unfavorable	3-4	Intermediate	63.0	Dead

Demographics

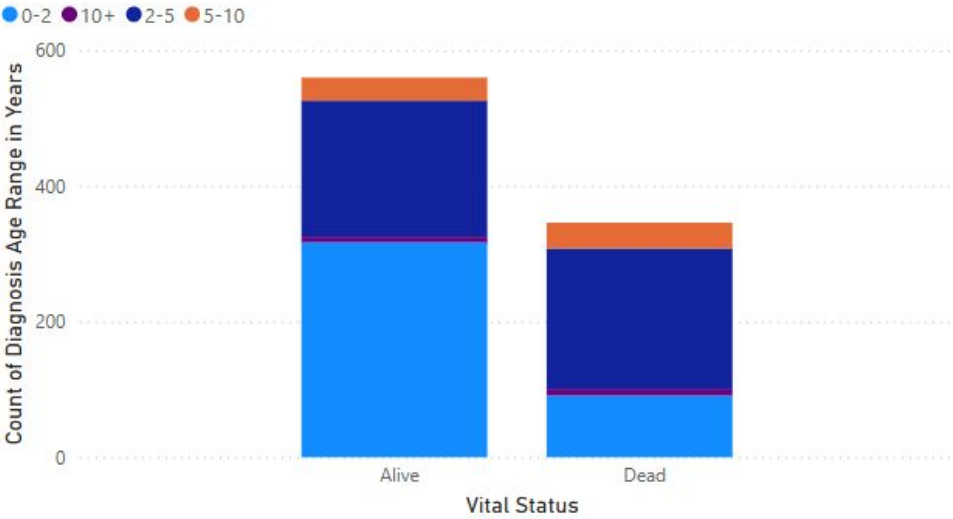
- Dataset is mostly White
- Relatively even distribution of Gender and Vital Status
- Most patients are in diagnosis age range from birth to 5 years old
- Patient prognosis will be determined by vital status and weeks of survival after diagnosis



Gender by Vital Status



Diagnosis Age Range (Yrs.) by Vital Status

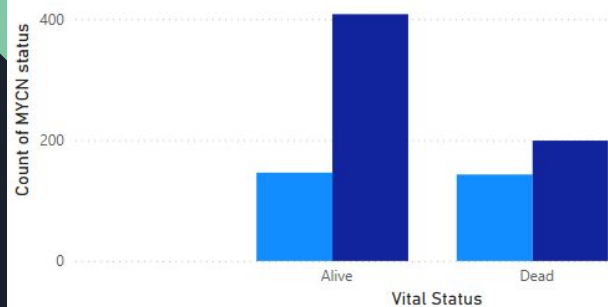


	Survival Time in Weeks		
	mean	std	size
Gender			
Female	305.542636	192.756592	387
Male	316.440385	196.454960	520

	Survival Time in Weeks			t-test	p-value
	mean	std	size		
Diagnosis Age Range in Years					
0-2	347.781863	184.909551	408	3.92	0.00
10+	295.333333	147.367089	18	-0.47	0.64
2-5	277.772059	205.290780	408	-3.35	0.00
5-10	305.319444	165.747035	72	-0.33	0.74

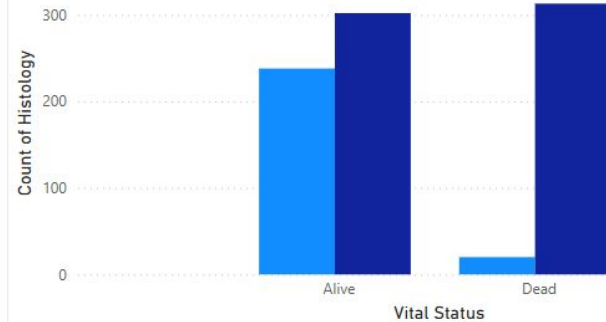
MYCN status by Vital Status

● Amplified ● Not Amplified



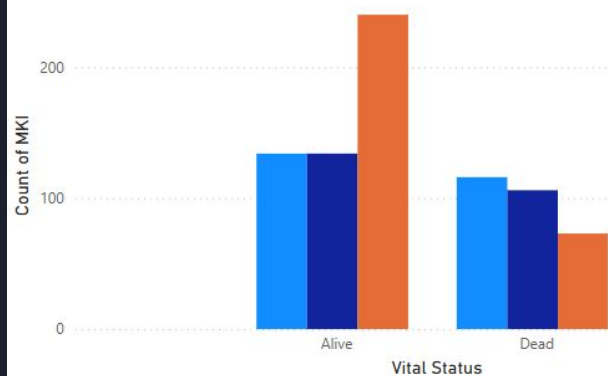
Histology by Vital Status

● Favorable ● Unfavorable



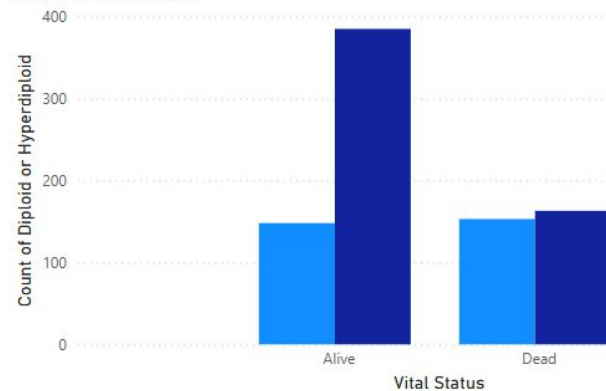
MKI by Vital Status

● High ● Intermediate ● Low



Diploid or Hyperdiploid by Vital Status

● Diploid ● Hyperdiploid



Analysis

- Patients w/ diploid chromosome, unfavorable histology and amplified MYCN status have a significantly lower survival time.
- There is a significantly lower survival time between high/intermediate and low MKI
- Patients who survived tended to have a non-amplified MYCN status, a favorable histology, a low MKI status and hyperdiploidy
- No significant variance in sex
- Higher survival time in pt's of diagnosis age range 0-2 years and lower survival time in age range 2-5 years

Survival Time in Weeks				Survival Time in Weeks			
				mean	std	size	
Diploid or Hyperdiploid				Histology			
Diploid	255.498339	193.873010	301	Favorable	400.255814	154.569329	258
Hyperdiploid	347.169708	186.039798	548	Unfavorable	278.089431	198.052621	615
Unknown	269.655172	207.235314	58	Unknown	250.088235	200.567735	34
				Survival Time in Weeks			
				mean	std	size	
MYCN status				MKI			
Amplified	253.553633	205.415377	289	High	279.512000	199.956486	250
Not Amplified	338.866557	183.677757	607	Intermediate	310.162500	198.353734	240
Unknown	347.727273	190.315575	11	Low	356.383387	178.122455	313
				Unknown	258.932692	196.245253	104

	Male vs Female	MYCN Amplified vs NonAmplified	Diploid vs Hyperdiploid	Histology Unfavorable vs Favorable	MKI High vs Intermediate	MKI Intermediate vs Low	MKI High vs Low
Survival Time t-test	0.84	-6	-6.69	-9.77	-1.7	-2	-4.76
p-value	0.4	0	0	0	0.09	0.046	0
Statistically Significant?	No	Yes	Yes	Yes	No	Yes	Yes



Conclusions

- High tumor break load indicates reduced survival time in patients w/ adrenocortical carcinoma
- A lower aneuploidy score and percent genome altered is associated with paragangliomas, which tend to be more dangerous than pheochromocytoma
- Diploidy, unfavorable histology, amplified MYCN status and high and intermediate MKI indicate a reduced survival time in patients with neuroblastoma
- Higher survival time in neuroblastoma pt's diagnosed from birth to 2 years of age, and lower survival time for pt's diagnosed from 2-5 years old
- Most conclusions are made using samples with a White majority and a relatively even gender distribution



References

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