UNDERSTANDING SURVIVAL PATTERNS AND PREDICTORS IN PRIMARY BRAIN TUMOR PATIENTS

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Identification of Stakeholders

Research Questions

Study Design

Data Preprocessing

Data Analysis

Results and Conclusions

Primary stakeholders:

- Doctors and oncologists

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Do the patient's characteristics impact the survival time?

Which circumstances increase the risk of death?

WORKFLOW

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DATASET

Primary Brain Tumor Patients							
sex	diagnosis	loc	ki	gtv	stereo	status	time
Female	Meningioma	Infratentorial	90	6.11	SRS	0	57.64
Male	HG glioma	Supratentorial	90	19.35	SRT	1	8.98
Female	Meningioma	Infratentorial	70	7.95	SRS	0	26.46
Female	LG glioma	Supratentorial	80	7.61	SRT	1	47.80
Male	HG glioma	Supratentorial	90	5.06	SRT	1	6.30
Female	Meningioma	Supratentorial	80	4.82	SRS	0	52.75
Male	Meningioma	Supratentorial	80	3.19	SRT	0	55.80
Male	LG glioma	Supratentorial	80	12.37	SRT	0	42.10

Source: I. Selingerova, H. Dolezelova, I. Horova, S. Katina, and J. Zelinka. Survival of patients with primary brain tumors: Comparison of two statistical approaches. PLoS One, 11(2):e0148733, 2016. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4749663/

Reference: James, G., Witten, D., Hastie, T., and Tibshirani, R. (2021) An Introduction to Statistical Learning with applications in R, Second Edition, https://www.statlearning.com, Springer-Verlag, New

Masakyr Memorial Cancer Institute in Brno (Czech Republic).

The first patient was included into the study in 2004, the last in 2011.

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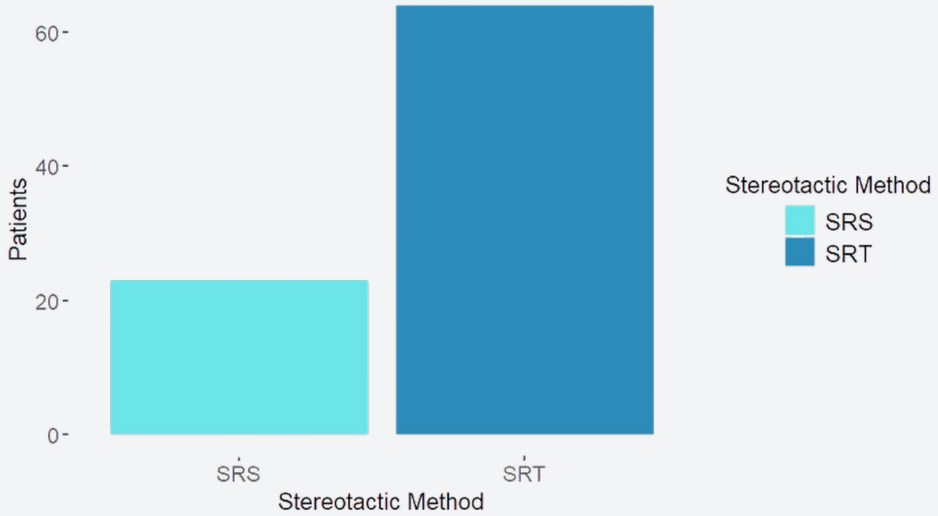
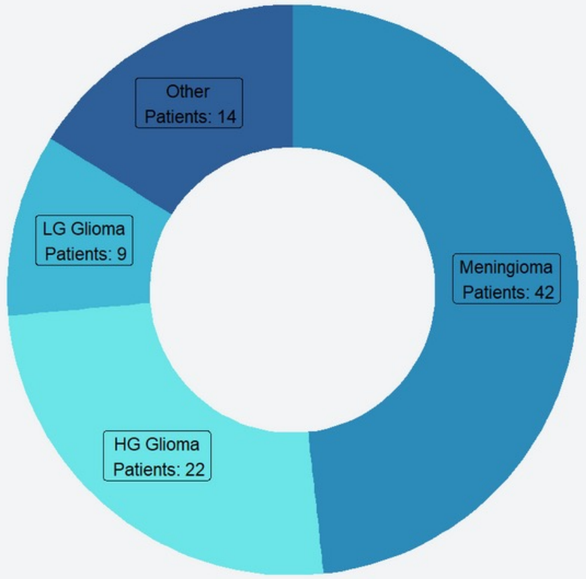
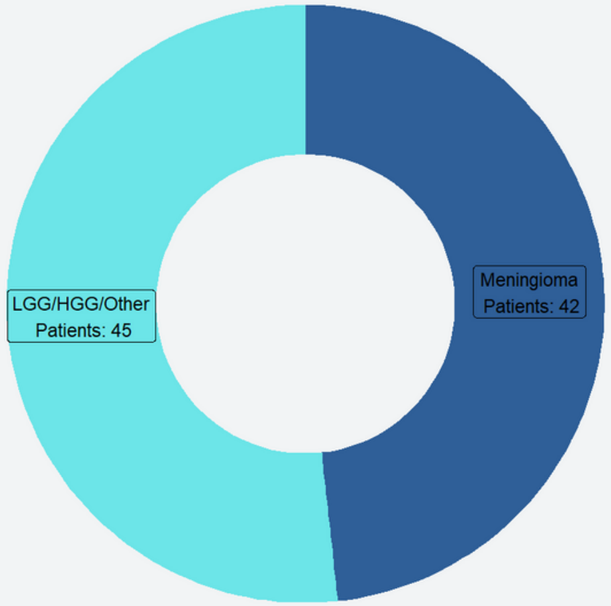
Amount of Patients with Each Stereotactic Method

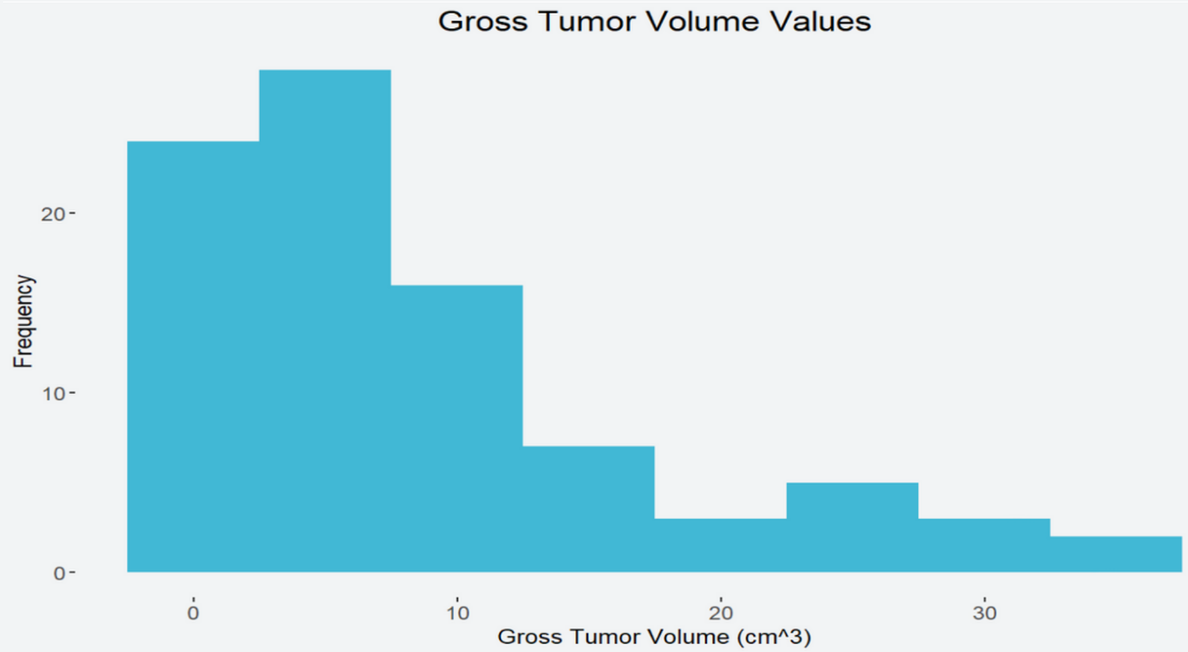


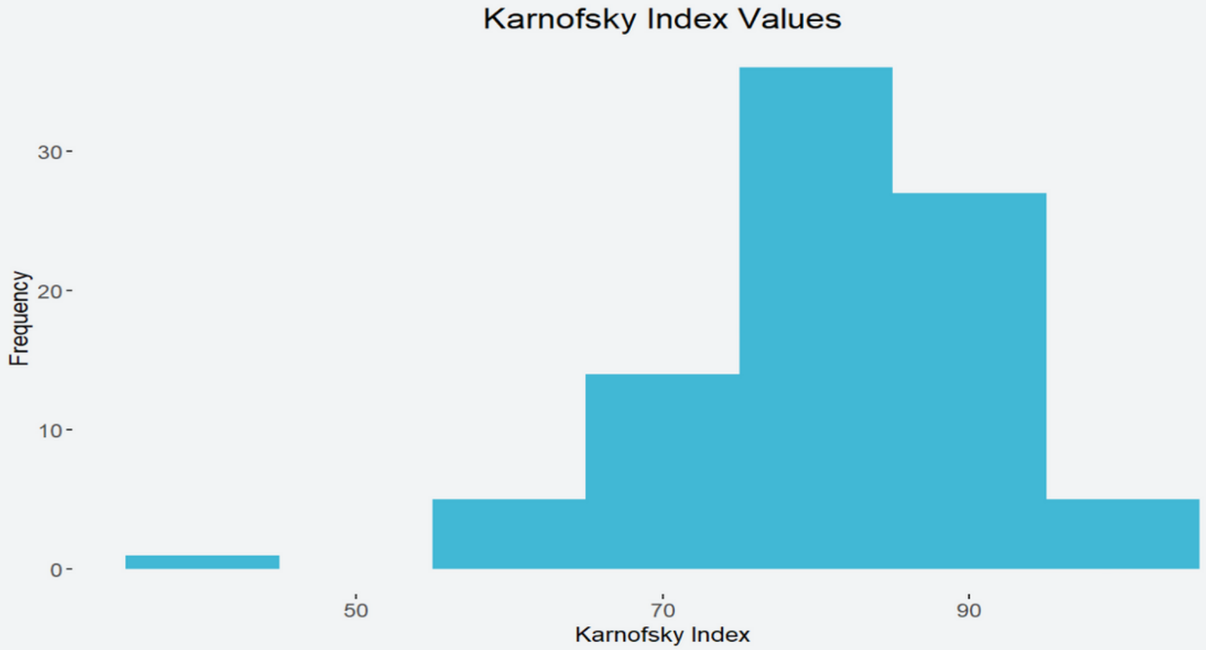
Amount of Patients with Each Diagnosis

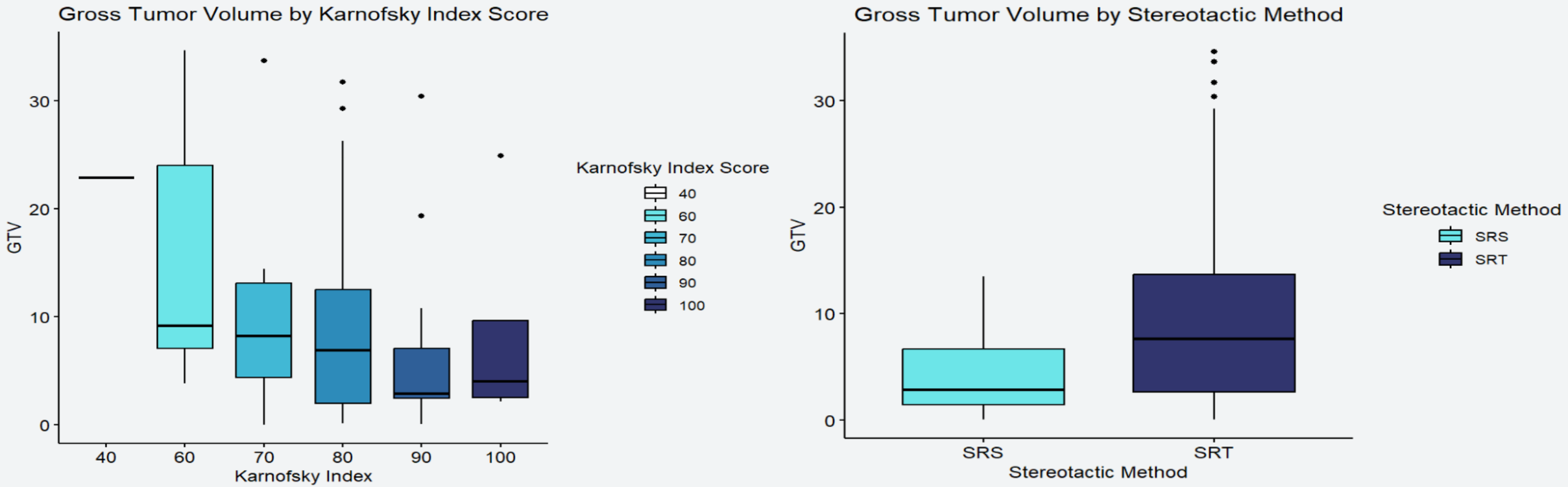


Amount of Patients with Each Diagnosis



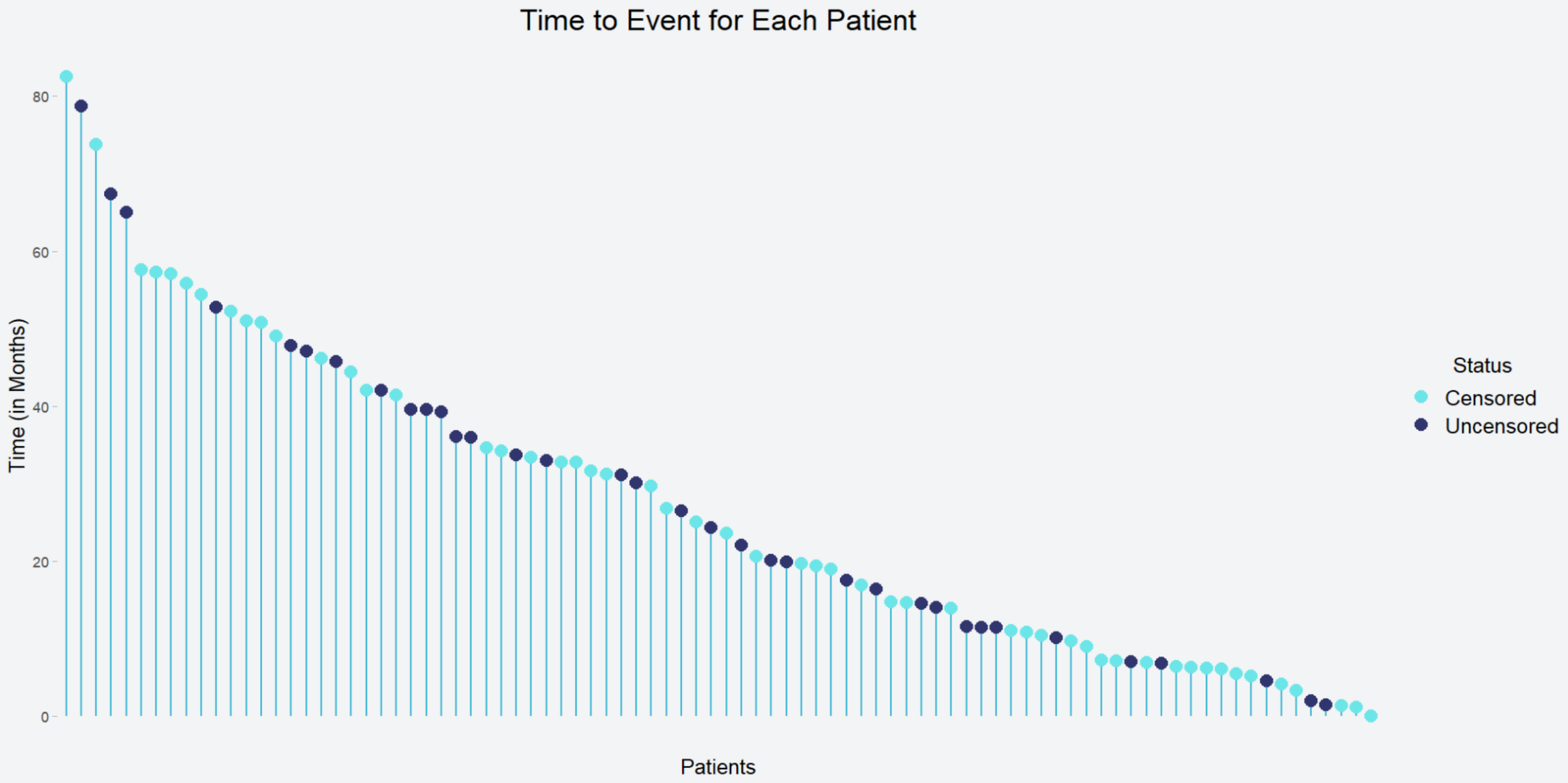

Gross Tumor Volume Values
Frequency
0
10
20
0
10
20
30
Gross Tumor Volume (cm^3)


Karnofsky Index Values
Frequency
0
10
20
30
50
70
90
Karnofsky Index



As the Karnofsky Index score increases, the gross tumor volume decreases.

Patients who underwent stereotactic radiotherapy tended to have a larger gross tumor volume.


Time to Event for Each Patient
Time (in Months)
0
20
40
60
80
Patients
Status
Censored
Uncensored

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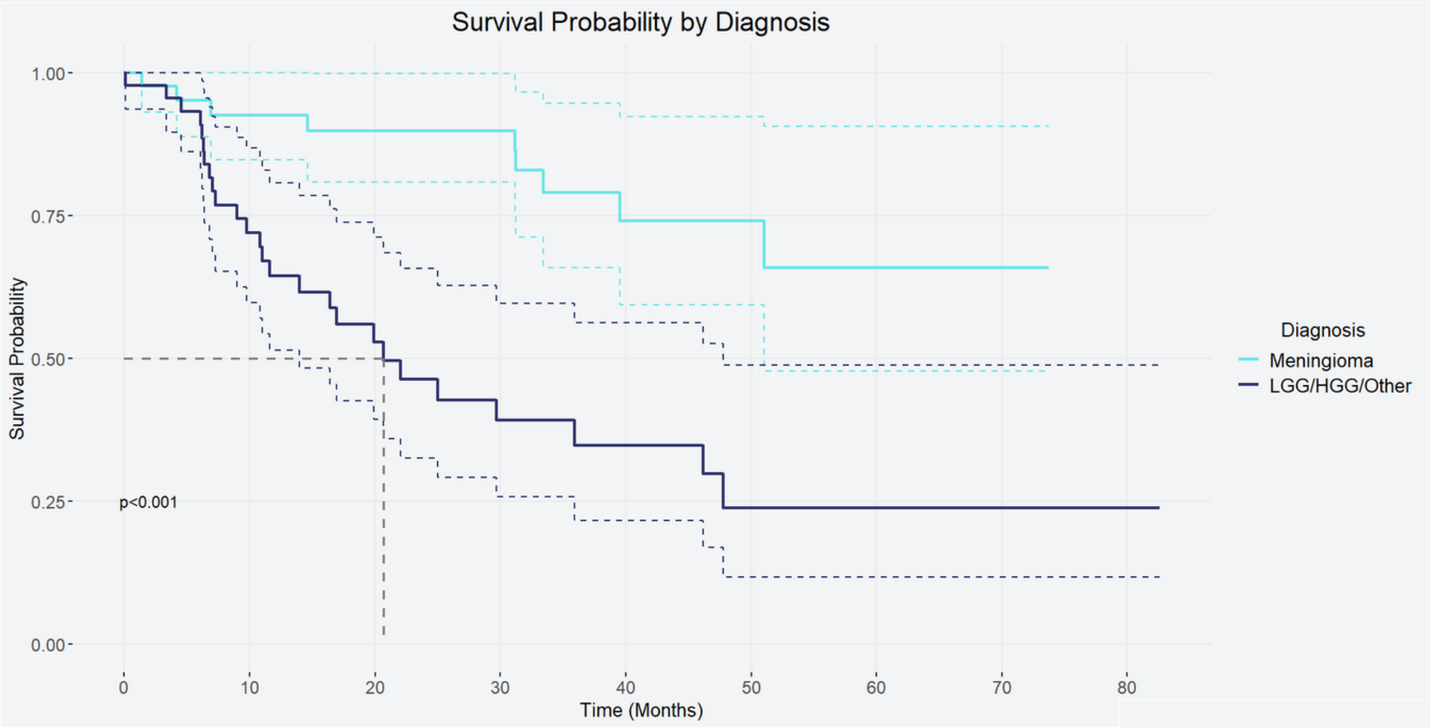
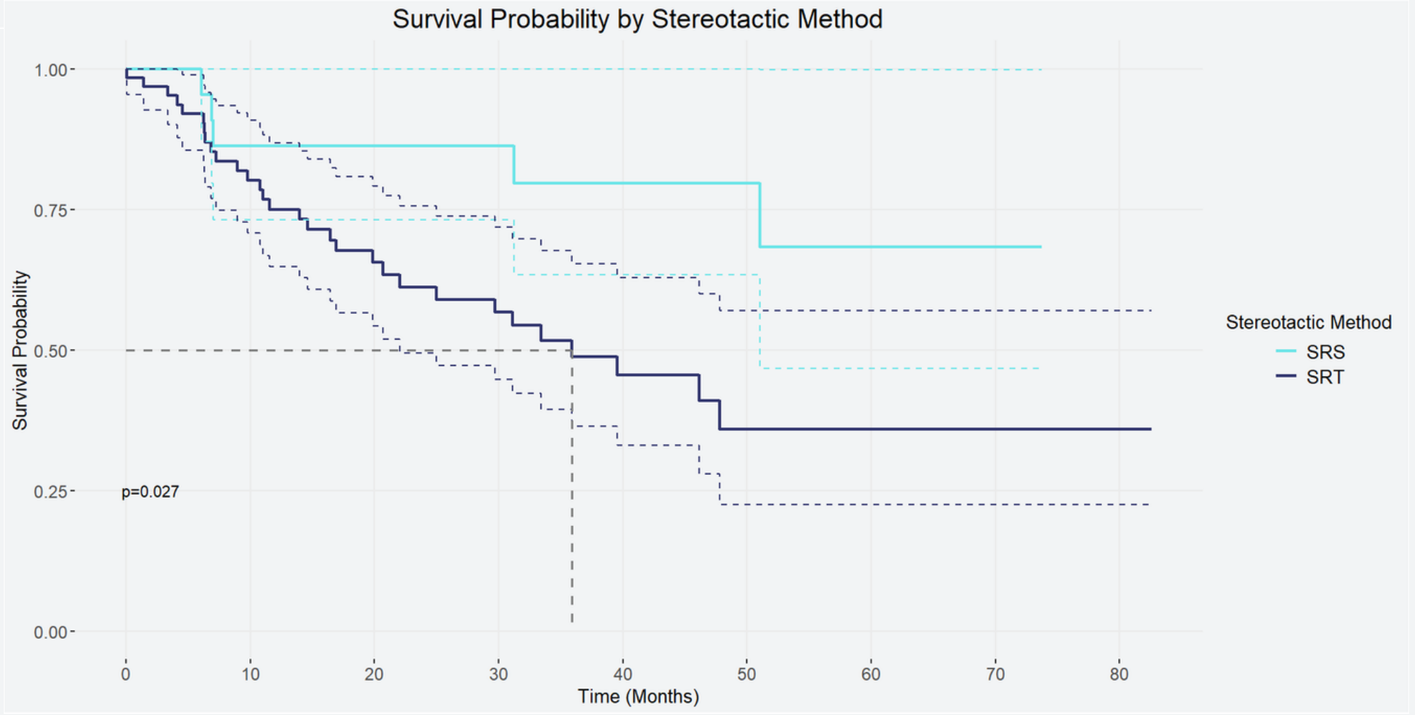
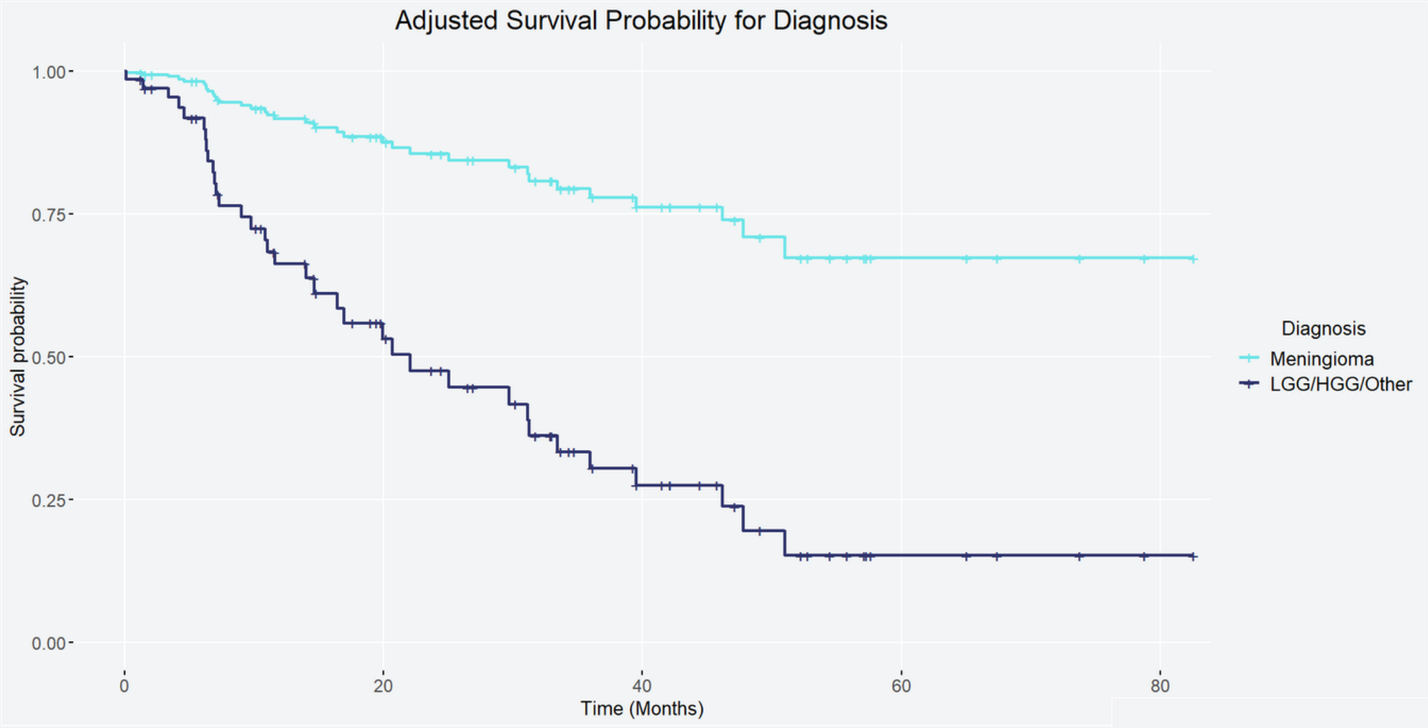
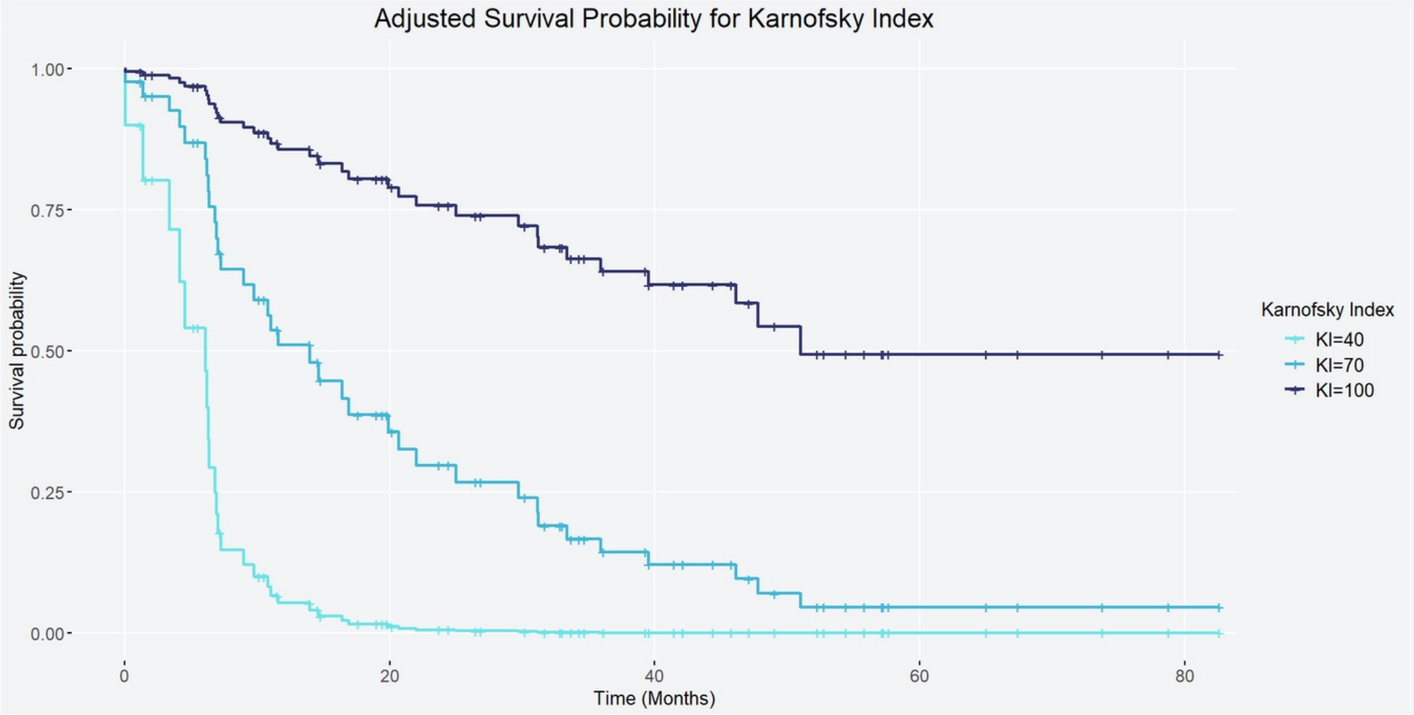

Survival Probability by Diagnosis
Survival Probability
1.00
0.75
0.50
0.25
0.00
p<0.001
0
10
20
30
40
50
60
70
80
Time (Months)
Diagnosis
Meningioma
LGG/HGG/Other


Survival Probability by Stereotactic Method
Survival Probability
1.00
0.75
0.50
0.25
0.00
p=0.027
0
10
20
30
40
50
60
70
80
Time (Months)
Stereotactic Method
SRS
SRT


Adjusted Survival Probability for Diagnosis
Survival probability
1.00
0.75
0.50
0.25
0.00
0
20
40
60
80
Time (Months)
Diagnosis
Meningioma
LGG/HGG/Other


Adjusted Survival Probability for Karnofsky Index
Survival probability
1.00
0.75
0.50
0.25
0.00
0
20
40
60
80
Time (Months)
Karnofsky Index
KI=40
KI=70
KI=100

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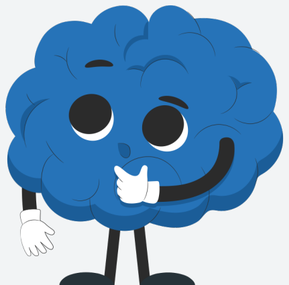
RESULTS AND CONCLUSIONS

- Patients with meningioma exhibit higher survival probabilities than those with other brain tumor types, indicating the importance of early and accurate diagnosis to implement effective treatment plans.

- Higher KI scores correlate with smaller tumor volumes and better survival rates: assessing the KI score of the patient can be a valuable information when choosing the treatment the patient will go through.

- Stereotactic radiosurgery shows better survival outcomes compared to stereotactic radiotherapy: for patients with conditions that give them lower survival probabilities, the radiosurgery could be the optimal choice of treatment.



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References

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https://webeep.polimi.it/course/view.php?id=11749