



C03 -Radiomics to predict 1p/19q chromosomal codeletion status of low- grade gliomas

Cassia G¹, Silva TAM^{2,3}, Carvalho JLA³

1. DF Star Hospital - Rede D'Or São Luiz, Brasília-DF, Brazil
2. Instituto Federal Goiano - Campus Cristalina, Cristalina-GO, Brazil
3. Departamento de Engenharia Elétrica, Faculdade de Tecnologia, Universidade de Brasília, Brasília-DF, Brasil

February 2021

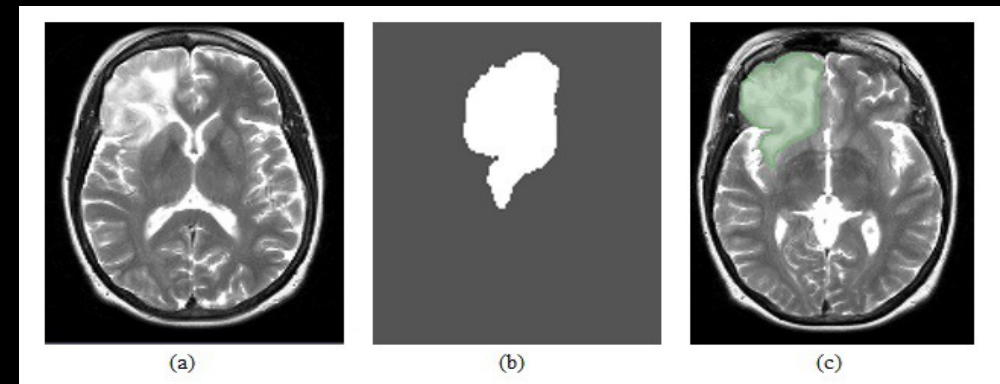
Overview

- Radiomics
- Low-grade gliomas
 - 1p/19q codeletion (oligodendroglioma)
 - median survival: up to 14 years
 - more sensitive do chemotherapy (procarbazine, lomustine and vincristine)
 - 1p/19q intact (astrocytoma)
 - median survival: up to 8 years

Methods



- LGG-1p19qDeletion dataset - The Cancer Imaging Archive database
 - 159 low-grade gliomas (102 codeleted, 57 intact)
 - 1p19q codeletion status confirmed through FISH
- Segmentation - Axial T2-weighted images– 1mm slice thickness
- 102 Features extracted – PyRadiomics



Methods

- Data pre-processing
 - normalization, dimensionality reduction, and synthetic augmentation
- Analysis
 - Parametrized multilayer perceptron neural network

Results

- Classification reached 85% precision, 88% sensibility, and 73,5% specificity

Discussion

- Accuracy and sensitivity
 - Multilayer perceptron neural network > support vector machine and random forest algorithms
- Specificity
 - Multilayer perceptron neural network > support vector machine
- Radiomics can be used to non-invasively technique predict 1p/19q chromosomal codeletion, through analysis of features extracted from T2-weighted images, based on multilayer perceptron neural network classification

Thank you!

- References

1. Akkus Z, Ali I, Sedlář J, Agrawal J P, Parney I F, Giannini C, Erickson B J. Predicting Deletion of Chromosomal Arms 1p/19q in Low-Grade Gliomas from MR Images Using Machine Intelligence. J Digit Imaging. 2017 Aug; 30(4): 469–476. Published online 2017 Jun 9. doi: [10.1007/s10278-017-9984-3](https://doi.org/10.1007/s10278-017-9984-3). PMID: PMC5537096
2. Griethuysen J J M, Fedorov A, Parmar C, Hosny A, Aucoin N, Narayan V, Beets-Tan R G H, Fillon-Robin J C, Pieper S, Aerts H J W L. Computational Radiomics System to Decode the Radiographic Phenotype. Cancer Research, 77(21), e104–e107. <https://doi.org/10.1158/0008-5472.CAN-17-0339>
3. Goodfellow I. et al. Deep Learning. MIT Press, 2016.