Cancer Imaging Phenomics Toolkit (CaPTk):

A Radio(geno)mics Platform for Quantitative Image Analytics

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FUNDING: NIH/NCI/ITCR U24CA189523

Primary Aim: To enable swift and efficient translation of cutting-edge academic research into clinically useful tools[1].

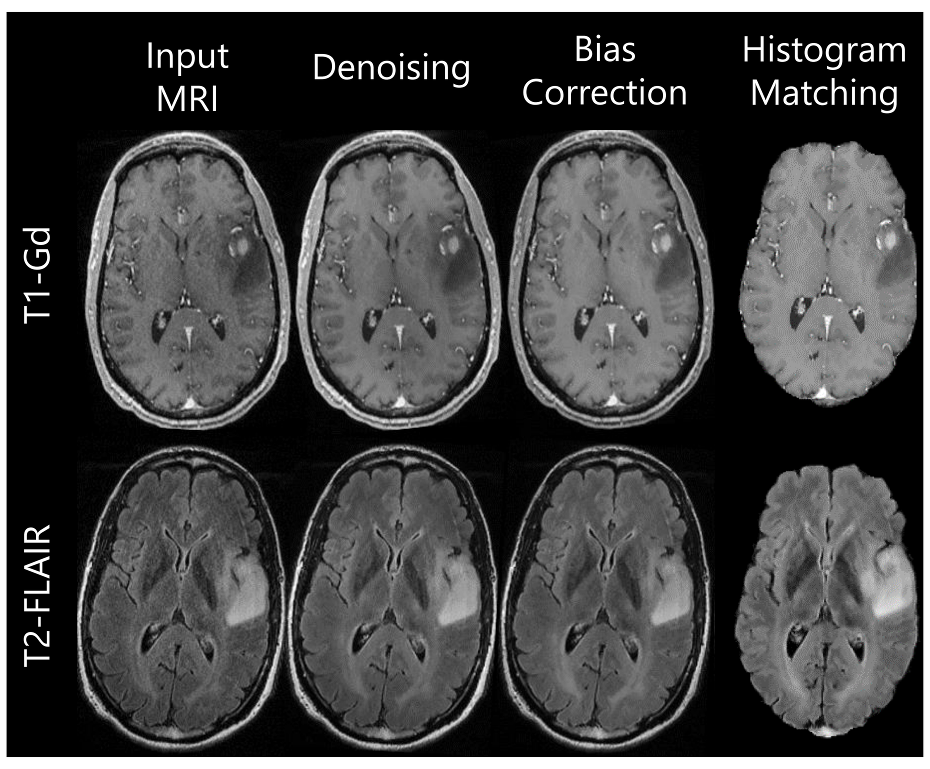
Target Audience:

- ***Clinical experts***: facilitating use of complex algorithms for clinically relevant studies through a user-friendly interface.
- ***Computational experts***: allowing batch-processing of multiple subjects and integration of new algorithms.

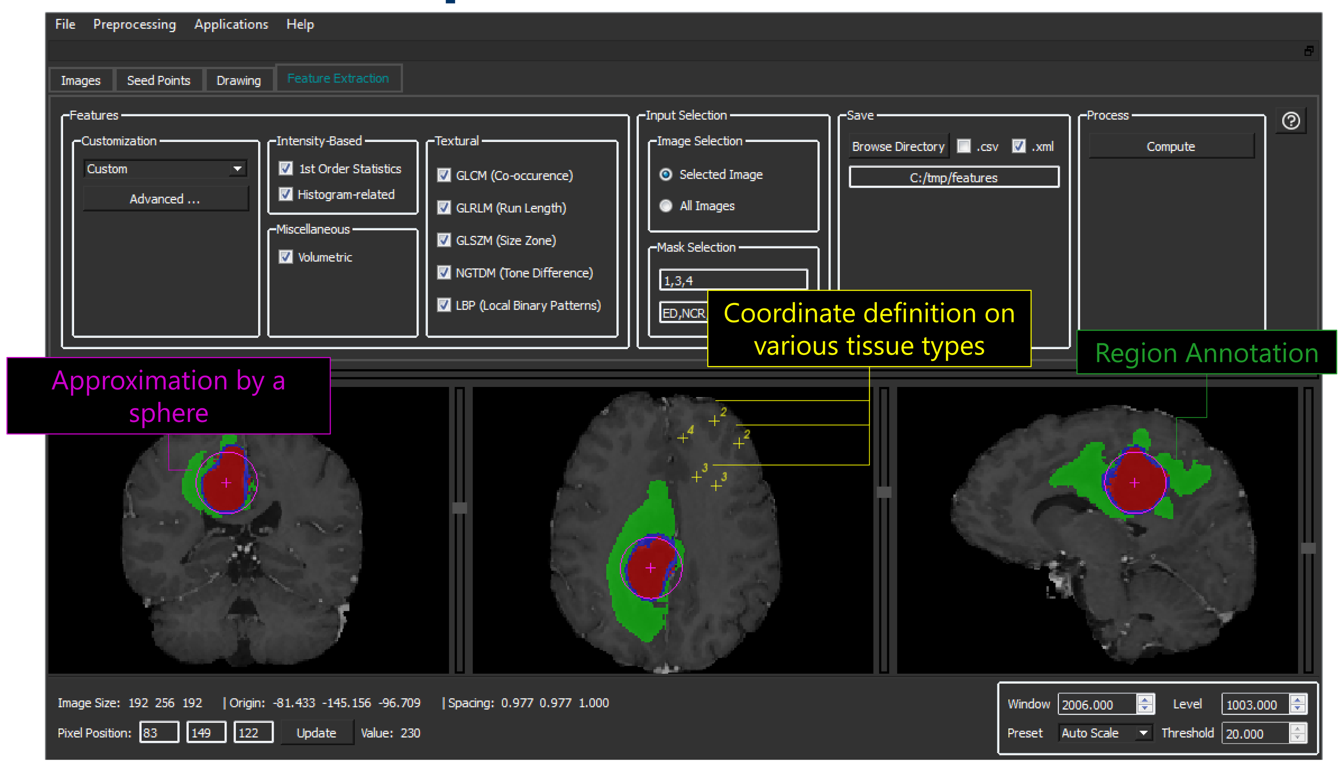
www.cbica.upenn.edu/captk

– General Purpose Tools –

Pre-processing[2]

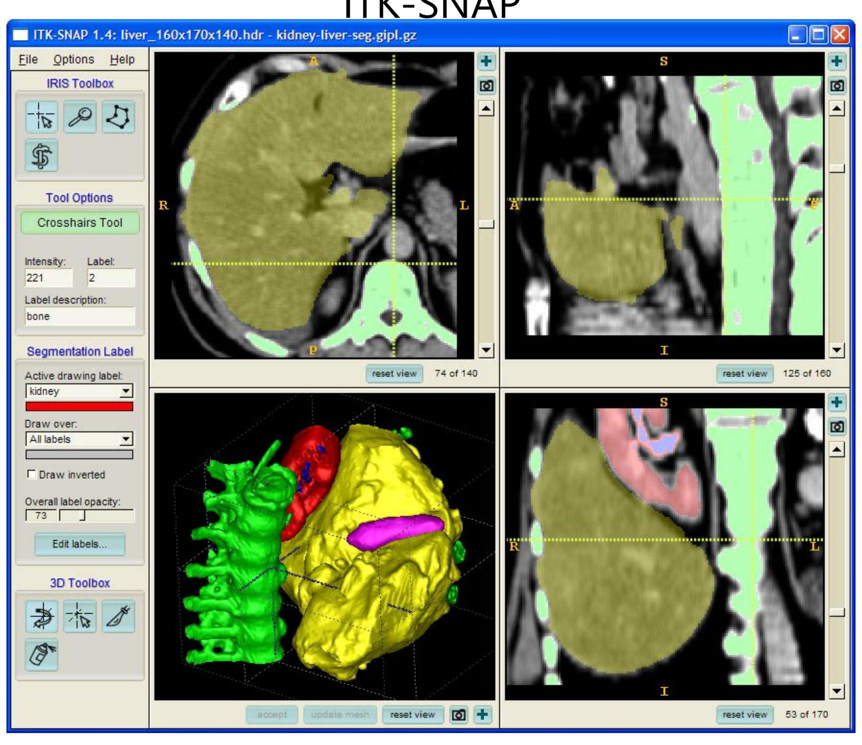


Graphical Interaction



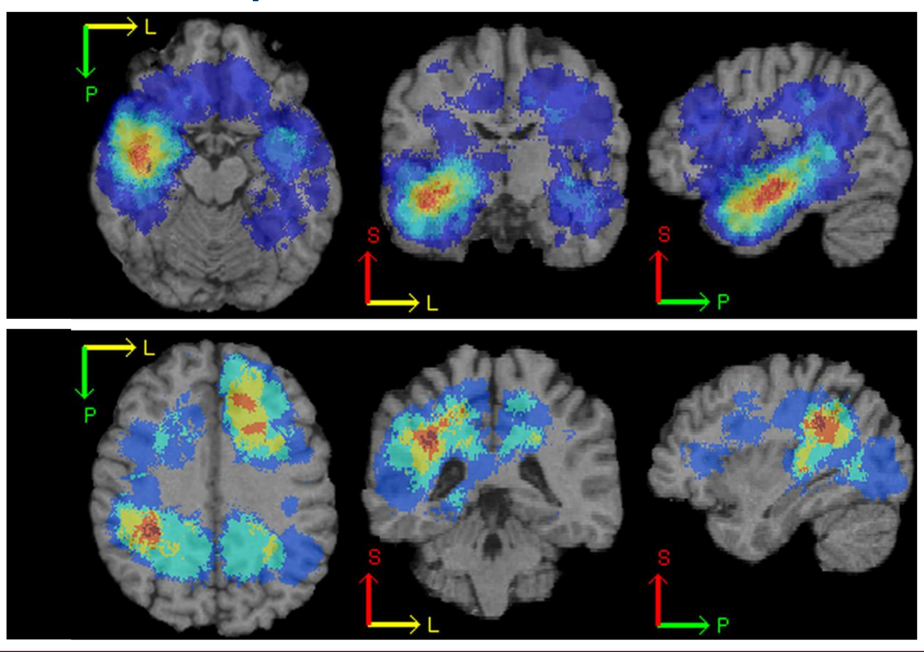
Segmentation [3,4]

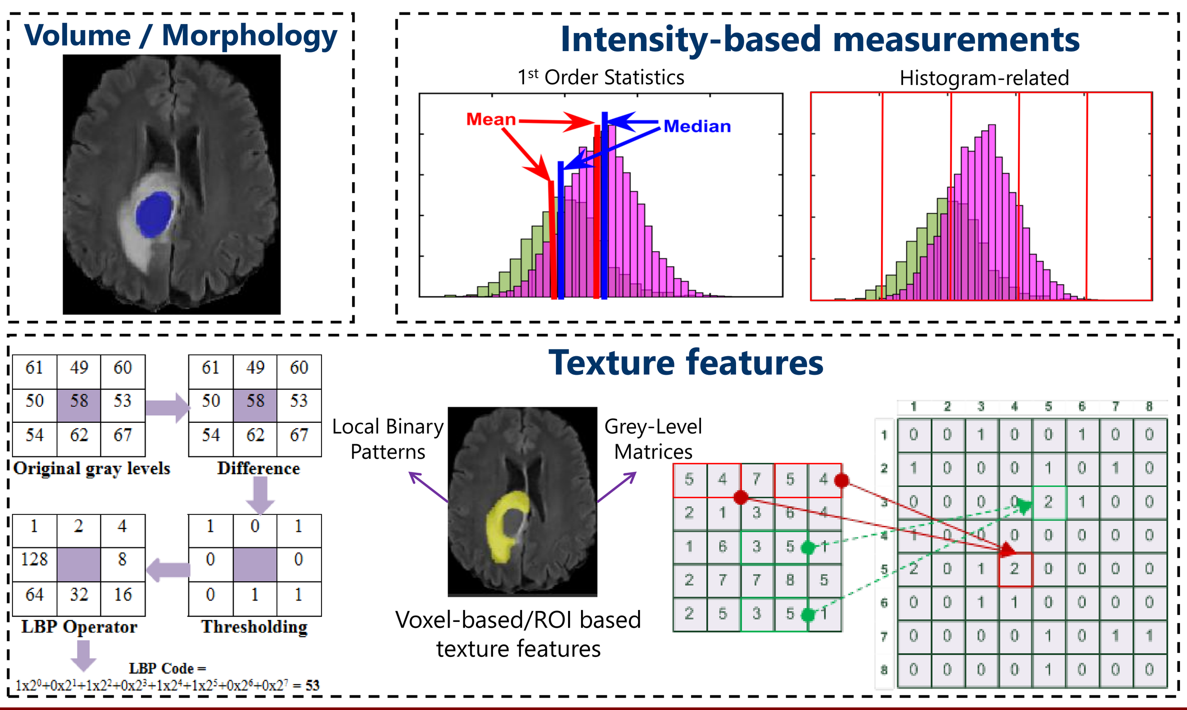
ITK-SNAP



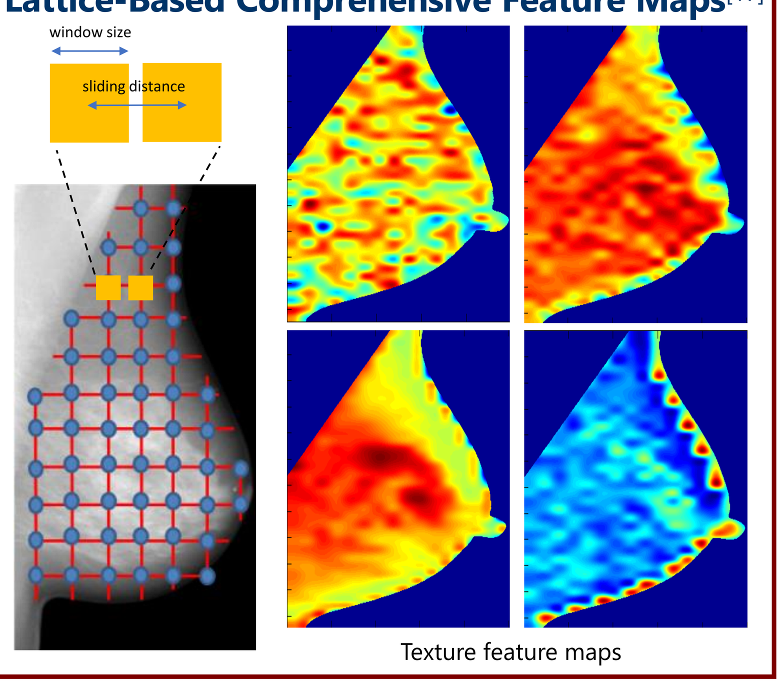
Quantitative Feature Extraction

Spatial Distribution Atlases





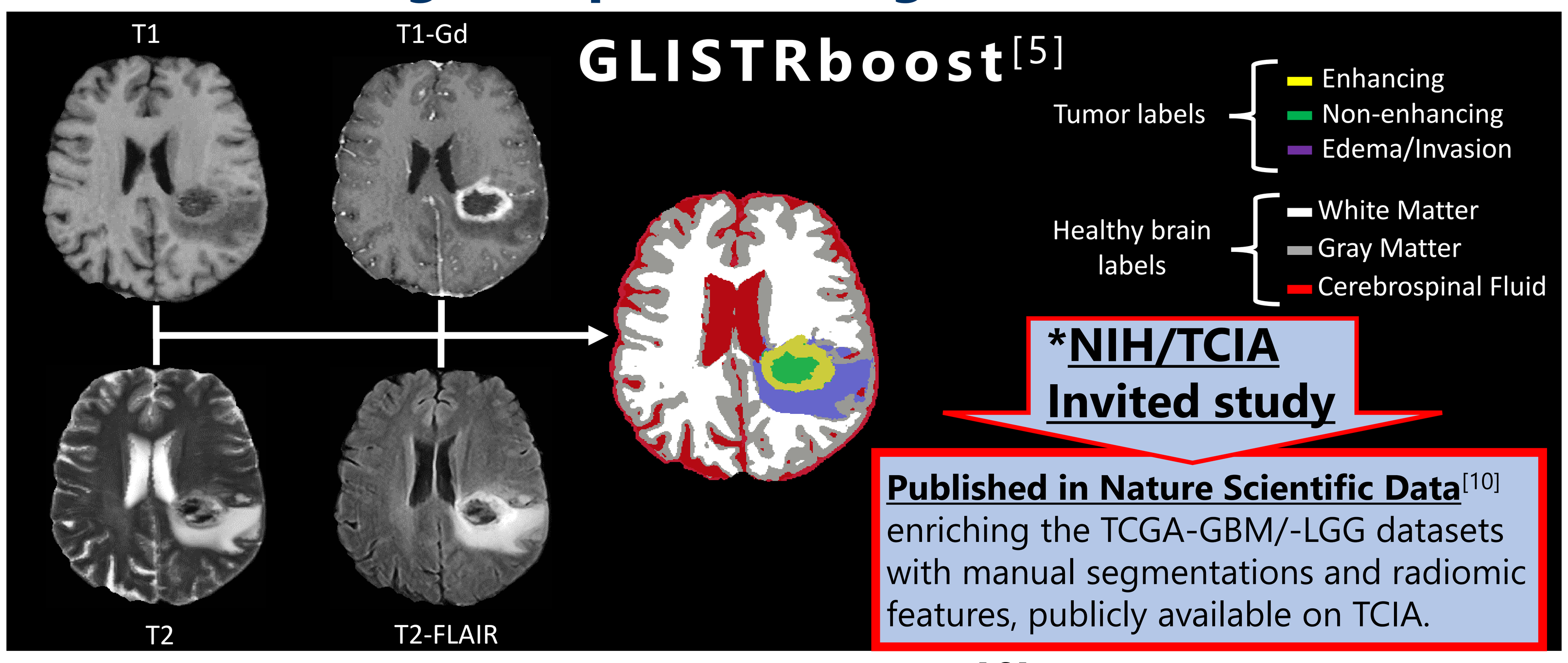
Lattice-Based Comprehensive Feature Maps[17]



Texture feature maps

– Specialized Applications –

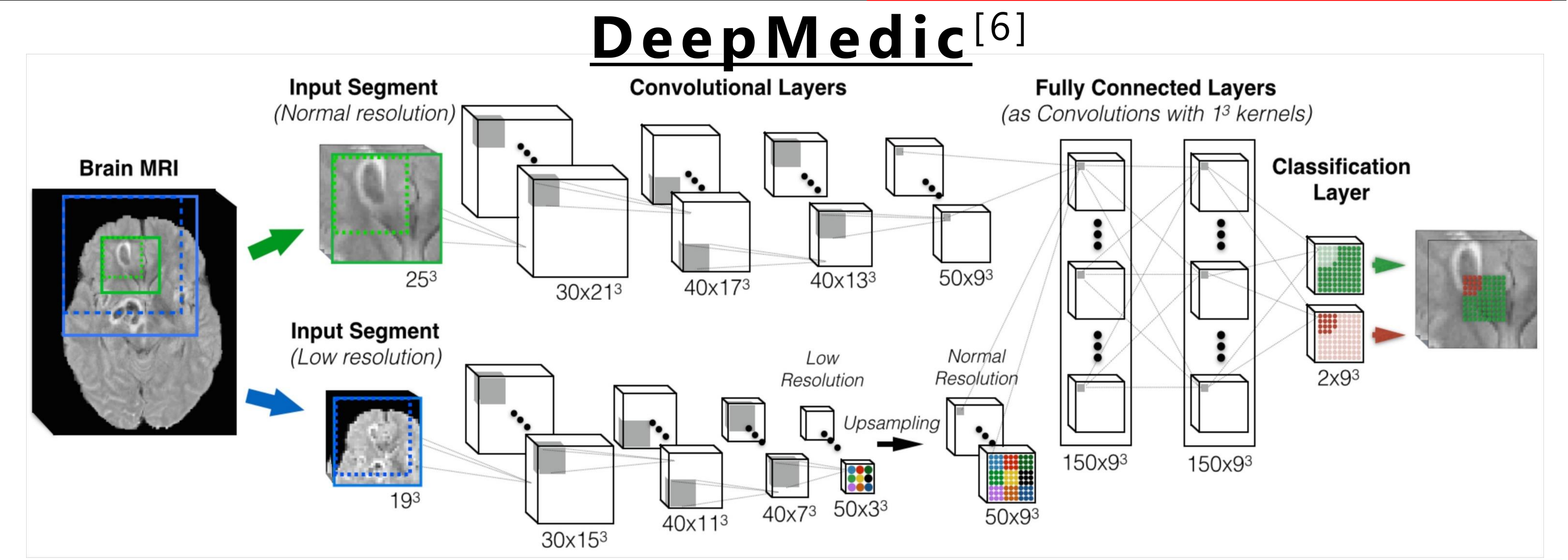
Organ-Specific Segmentation



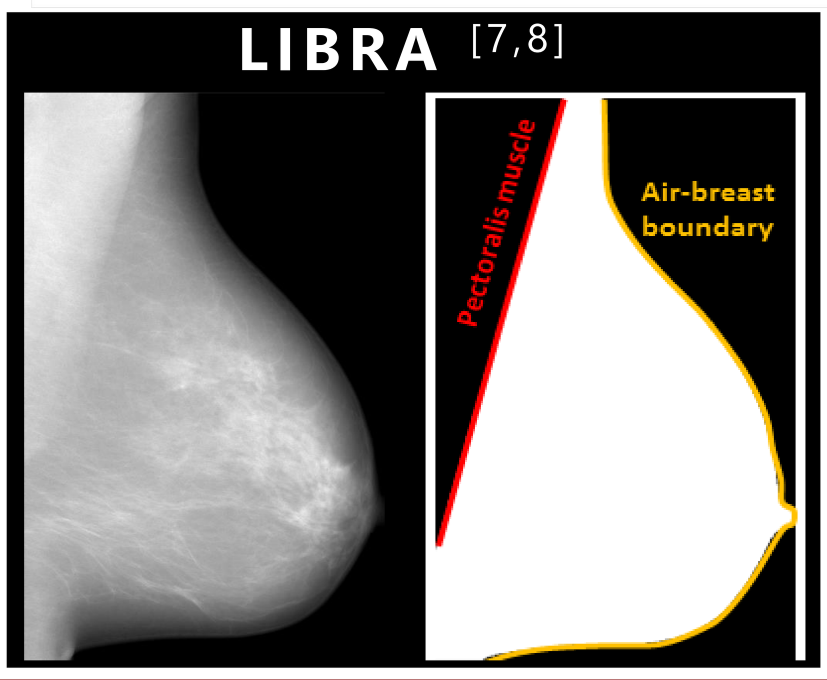
NIH/TCIA Invited study

Published in Nature Scientific Data[10] enriching the TCGA-GBM/-LGG datasets with manual segmentations and radiomic features, publicly available on TCIA.

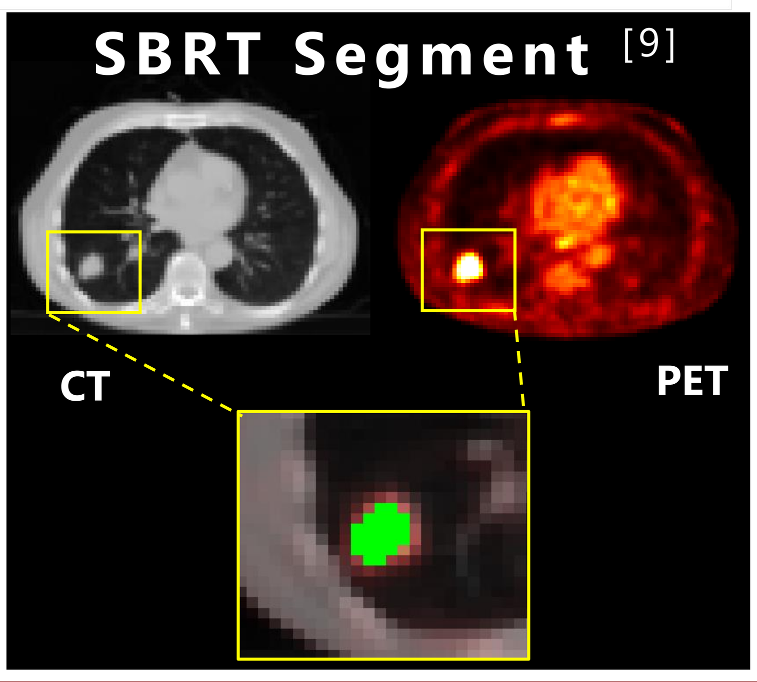
DeepMedic[6]



LIBRA [7,8]

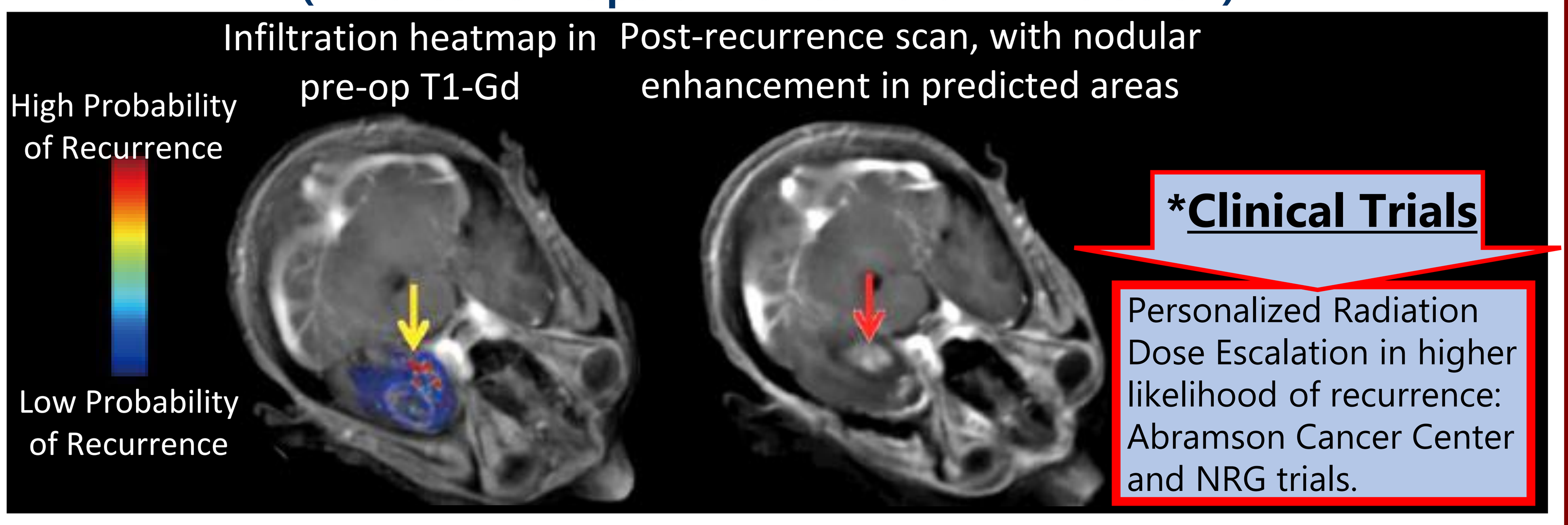


SBRT Segment [9]



GBM Recurrence Prediction [11, 12]

(Predictive Maps of Peritumoral Infiltration)

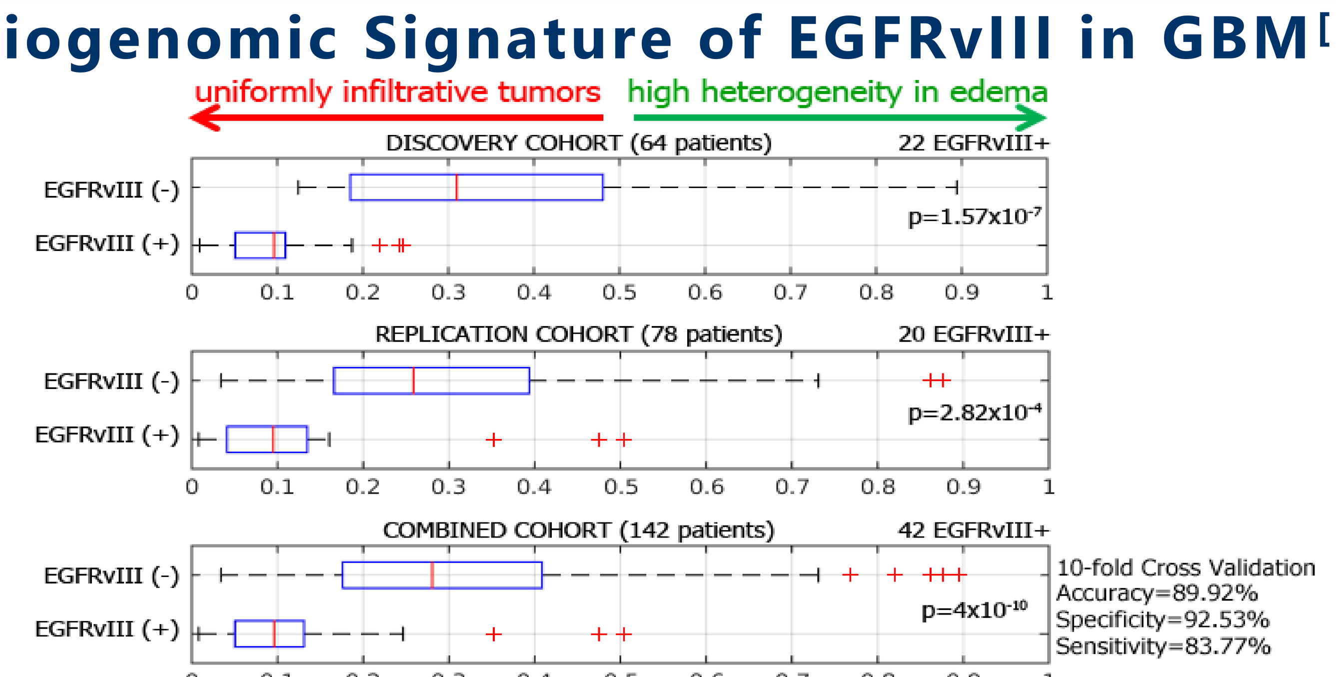


***Clinical Trials**

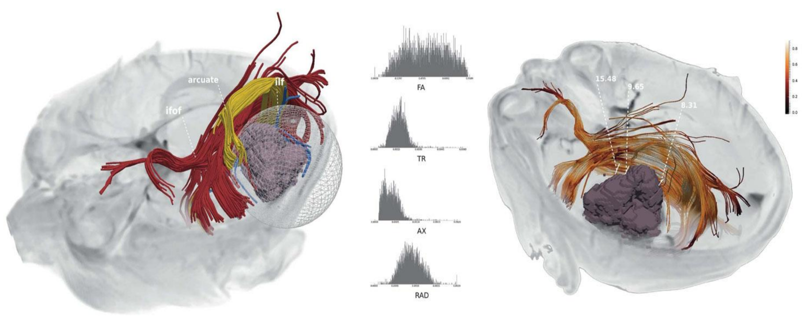
Personalized Radiation Dose Escalation in higher likelihood of recurrence: Abramson Cancer Center and NRG trials.

Radiogenomic Signature of EGFRvIII in GBM[13]

uniformly infiltrative tumors — high heterogeneity in edema



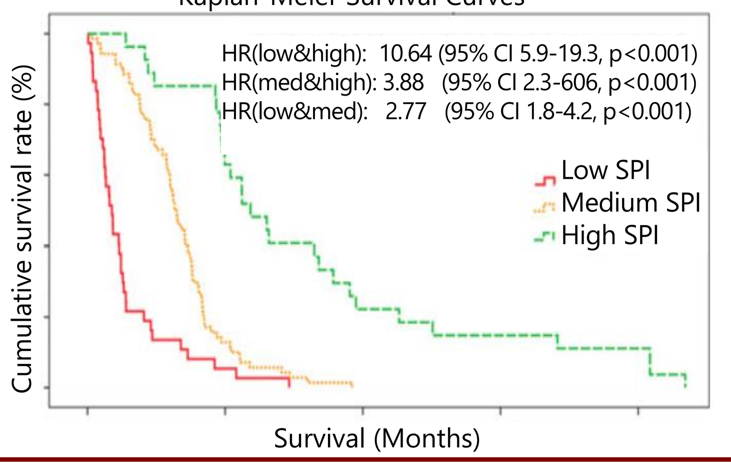
Computational Study of Brain Connectivity[14,15]



DTI-based Resection Margin Estimation — Peritumoral Effects of Glioblastoma

GBM Survival Prediction[16]

Kaplan-Meier Survival Curves



– Future Directions –

Cohort-Based Interface | Traditional Machine Learning Training Module | Multiscale Feature Extraction

References

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