Understanding of Radiomics Using MRI

SY18-1

Experience of radiogenomics research in brain imaging

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Gliomas are the most common primary neoplasm of the brain, varying histopathologically from low grade to high grade. High-grade gliomas (HGGs) include World Health Organization (WHO) grade III and IV brain tumors such as anaplastic oligodendroglioma, anaplastic oligoastrocytoma, anaplastic astrocytoma (AA), and primary or secondary glioblastoma multiforme (GBM). Primary GBMs arise de novo in older patients, while secondary GBMs develop from WHO grade II or III gliomas having a longer duration of gliomagenesis with early event as isocitrate dehydrogenase (IDH) gene mutation.

Radiogenomics represents the evolution of the radiology-pathology correlation from the tissue level to the subcellular level. Radiogenomic analysis, which is the identification of imaging traits that correspond to different molecular phenotypes with clinical and biologic relevance, has been demonstrated in different tissues and with different imaging modalities. Different MR imaging radiogenomic signatures have been identified successfully for GBM; these have been reflective of different cellular processes and can be used to predict clinical outcomes by using gadolinium-enhanced MR imaging and genome-scale messenger RNA microarray profiling. There continues to be an increasing number of studies in which researchers explore and define the genomic characteristics of MR imaging features in patients with GBM. The predictive capabilities of these signatures lead to exciting and compelling implications, both for understanding how molecular programs are revealed at tissue and imaging levels and for potentially understanding the molecular pathogenesis of a given tumor.

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Keywords : Radiogenomics, Glioma

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Technical Approach of Radiomics

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This presentation will cover overview of radiomics approach for breast cancer. Details regarding various features of radiomics will be covered as well.

Keywords : Radiomics, Breast Cancer, Texture Analysis

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SY18-3

Radiomics data analysis: issues and challenges

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An increase in data set sizes facilitated data process and interpretation. “Radiomics” coins the emerging effort to extract information from radiology images. In this talk, I revisit the concepts of variable selections, model development and basic machine learning algorithms, and introduce the special data analysis technique specially designed for radiomics. Promise and pitfalls of quantitative imaging – overfitting, data interpretation, clinical implication - will be explained.

Keywords : Radiomics, Variable selection