Syllabus for "*Managing Big Data for Genomics & Proteomics*"

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Objectives

This objective of this course is to introduce and discuss the concept of big data in relation to genomics, proteomics, radiomics, and radiogenomics in cancer, specifically in brain tumors. Emphasis will be on genomics and radiomics with regards to the high-dimensional, high-throughput feature extraction of imaging features from medical images, specifically MRI; the second emphasis will be on the use of imaging in relation to underlying tumor genomics, how to use MRI as a biomarker, surrogate and correlate of tumor genomics as well as the use of MRI as a genomic target discovery tool and its application in therapeutic discovery and drug development. The role of genomics, proteomics, radiomics and imaging genomics in the era of big data and how we can leverage these -omic data will be discussed.

The audience should be able to understand:
1- the field of genomics, proteomics, radiomics and imaging genomics
2- the application of these –omic fields in big data to leverage cancer omic/cancer imaging
3- current initiatives in big data
4- managing and leveraging omic big data
5- the integration of genomics, proteomics, radiomics and imaging genomics into big data platforms

References

Zinn PO, Majadan B, Sathyan P, Singh SK, Majumder S, Jolesz FA, ***Colen RR.*** Radiogenomic Mapping of Edema/Cellular Invasion MRI-Phenotypes in Glioblastoma Multiforme. PLoS ONE 2011 6(10): e25451. doi:10.1371/journal.pone.0025451 (http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0025451)

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ElBanan MG, Amer AM, Zinn PO, ***Colen RR***. Imaging genomics of glioblastoma: state of the art bridge between genomics and neuroradiology. Neuroimaging Clin N Am 25(1):141-153, 2/2015. PMID: 25476518.