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Research Protocol

Proactive Medicine Initiative-Predicting EGFR Mutation Heterogeneity In CT-Scans of Indian Patients with Adenocarcinomas of the Lung using Radiomics Algorithm

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Tumors are spatially and temporally heterogeneous, requiring biopsies or invasive surgeries to extract and analyze what are generally small portions of tumor tissue, which do not allow for a complete characterization of the tumor. Imaging provides a comprehensive view of the entire tumor and can be used on an ongoing basis to dynamically monitor the development and progression of the tumor or its response to therapy. Radiomics based quantitative imaging is a new dynamic field which could be co-related with large amount of available data of clinical parameters, gene expression profiles and other prognostic and predictive markers to further validate the optimum value of Precision and personalized medicine in cancer therapy. In this study, we explored radiomic features for extracting reliable information from CT (Computed Tomography) images used for biopsy guidance in adenocarcinomas of the lung, Leading to development of noninvasive biomarkers in predicting EGFR mutations at the time of biopsy and hence moving to a new process of proactive medicine.

Methods

41 patients retrospectively tested for EGFR mutations with diagnosis of adenocarcinomas of the lung were considered with Segmentation done manually by radiation oncologist and Radiologist on the available CT scans done during the biopsy to accurately know the site of the EGFR mutations and further classify mutations. ITK-C++ Software was used for radiomic feature extraction.3 dominant features were selected using Statistical rank test based in the highest AUC values. Predictive model was created using the most dominant features to closely determine EGFR mutations.

Results

Total of 94 radiomic features were extracted with Local homogeneity, Non-Uniformity of texture and texture wise prominence of the cluster being the dominant features and a predictive model was developed with all the three described features being statistically significant (<0.05),All the three described CT scan features were having a positive co-relation to EGFR mutations and the Predictive model developed showed sensitivity of 81.82% and specificity of 88.24% in prediction of EGFR mutations in the sites of biopsies done by interventional radiologist using CT-Scans.

Conclusion

Radiomic analysis of routinely performed CT images could provide imaging biomarkers for EGFR mutations and also determine the intra-tumoral heterogeneity and in-turn aid in making personalized and precision medicine more proactive and robust.

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Conflict of Interest

No conflict of interest.

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