Abstract Title:Predictive Efficacy of 11C-PD153035 PET Imaging for EGFR–Tyrosine Kinase Inhibitor Sensitivity in Non-small Cell Lung Cancer Patients

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Purpose: To determine the correlation of ^{11}C-PD153035 uptake with epidermal growth factor receptor-tyrosine kinase inhibitor (EGFR-TKI) sensitivity and phosphorylated EGFR (pEGFR) expression in non-small cell lung cancer (NSCLC) cell lines with different EGFR-TKI sensitivities and in their corresponding xenograf

METHODS: Four human NSCLC cell lines (HCC827, PC9, A549, and H1975) in the logarithmic phase were co-incubated with ^{11}C-PD153035 to analyze the correlation of ^{11}C-PD153035 uptake with EGFR-TKI sensitivity, and EGFR/pEGFR expression. Nude mice xenograft models bearing the four NSCLCs were prepared. ^{11}C-PD153035 positron-emission tomography (PET)-computed tomography (CT) was used to image the xenografts and observe radioactive uptakes.

RESULTS: Correlation of the in vivo uptakes with EGFR-TKI sensitivity, and EGFR/pEGFR expression was analyzed. HCC827 and PC9 cells, which were highly sensitive to EGFR-TKIs, exhibited higher ^{11}C-PD153035 uptakes than the other cells. A549 cells, which were moderately sensitive to EGFR-TKIs, showed higher uptake than the EGFR-TKI–resistant H1975 cells, which showed little or no uptake. Radioactive uptakes were positively correlated with pEGFR expression in all cells. PET-CT showed that radioactivity was highest in HCC827 xenografts. **Conclusions:**The radioactivity in PC9 xenografts was higher than that in A549 and H1975 xenografts. Tumor vs. non-tumor tissue ratio values were positively correlated with pEGFR expression in HCC827 and PC9 xenografts, but not in A549 and H1975 xenografts. In conclusion, ^{11}C-PD153035 can serve as an EGFR imaging agent in vitro and in vivo, and predicts sensitivity to EGFR-TKIs. This will provide an experimental basis for clinical applications of ^{11}C-PD153035 and individualized NSCLC therapy.