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Emerging role of metabolic response measured with 18F-FDG PET towards personalized radiotherapy or radio chemotherapy in lung cancer

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Abstract

Lung cancer is the leading cause of cancer death. Yet, current standard radiotherapy is still associated with local failure rates of 40% even with cisplatin-based concurrent chemotherapy in inoperable stage IIIA and IIIB non-small-cell lung cancer (NSCLC). Thus, a large number of patients still have residual cancer at the end of standard-dose radiotherapy and chemotherapy, but there are no means of predicting which ones. The goal of this research was to determine a bioimaging metabolic biomarker (BMB) capable of detecting residual cancer soon after standard radiotherapy and guiding supplementary therapy in timely fashion for patients with residual cancer. Critical elements of BMB necessary for personalized radiotherapy were determined. They are: (1). Earliest time point for attaining the maximum metabolic response (MRglc-MMR) with 18F-FDG PET after radiotherapy or radiochemotherapy, (2). The association between residual MRglc representing MRglc-MMR at 10-12 days (S2) after therapy and tumor control probability (TCP) at 12 months that was found to be an inverse dose response relationship. (3). The optimum cut-off values for identifying patients with high risk for residual cancer were determined by correlating different levels of MRglc-MMR at S2 with their corresponding TCP, sensitivity and specificity. If a cut-off value of MRglc ≤0.071 μmol/min/g by simplified kinetic method (SKM) or ≤1.45 of SUVmax is chosen, it offers a sensitivity of 100 % and a specificity of 63 %, meaning that these values will identify all patients with residual cancer for salvage therapy while it also includes 37 % of patients in whom complete tumor control has already been achieved. This is the first report on the potential utility of cut-off values of MRglc-MMR at S2 for developing personalized therapy in patients with lung cancer.

Biography

Noah C. Choi is professor of radiation oncology at Harvard Medical School and director of thoracic radiation oncology and distinguished scholar in thoracic oncology at Massachusetts General Hospital Cancer Center. His main research topics are: Bioimaging in radiotherapy for Lung Cancer supported by NIH/NIBIB grant R01 EB002907 and proton therapy for lung cancer. He published more than 130 papers in reputed journals.

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