

## Evaluation of the correlation between circulating tumor DNA dynamics and lung cancer chemotherapy efficacy

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**Background:** Response evaluation criteria in solid tumors (RECIST) is a commonly used method to evaluate lung cancer chemotherapy efficacy. However, the RECIST method is expensive, and easily causes radiation damage to patients. Circulating tumor DNA (ctDNA) dynamics refers to the fluctuation of ctDNA over a period of time, and it can be used as an indicator for monitoring the efficacy of chemotherapy through a non-invasive and radiation-free way in some cancers. But there are few reports on the application of ctDNA dynamics in monitoring the efficacy of lung cancer chemotherapy.

**Methods:** To assess the consistency between the ctDNA dynamics and efficacy of lung cancer chemotherapy, the peripheral blood of 238 lung cancer patients who will receive chemotherapy before each chemotherapy cycle were collected, and the efficacy of chemotherapy was evaluated by the RECIST method. Then, an ultrasensitive and quantitative method named LNA-dPNA PCR clamp was developed to monitor the dynamics of *EGFR* L858R in plasma. Finally, the consistency between *EGFR* L858R dynamics and the RECIST results were evaluated.

**Results:** Of the 238 patients with lung cancer, 125 patients have collected peripheral bloods for more than two chemotherapy cycles. Dynamics of *EGFR* L858R in plasma were detected from the 125 patients by LNA-dPNA PCR clamp. When the *EGFR* L858R was detected, the amplification sensitivity was  $10^0$  copies per reaction, the linearity was from  $10^0$  to  $10^7$  copies per reaction, and the limit of detection was 0.01%. After evaluation of *EGFR* L858R dynamics, 17 patients were positive for *EGFR* L858R mutations in peripheral blood, with a positive rate of 13.6%. Of the 17 patients, there were 11 patients with a consistent tendency of *EGFR* L858R dynamics and RECIST results, with a ratio of 64.7%; and 6 patients with inconsistencies, with a ratio of 35.3%.

**Conclusions:** This study preliminarily explored the feasibility of using ctDNA dynamics to evaluate the efficacy of lung cancer chemotherapy with a limited sample size; a non-invasive and non-radioactive method maybe developed to monitor the efficacy of lung cancer chemotherapy in the future.

**Key Words:** Lung cancer; ctDNA dynamics; *EGFR* L858R; LNA-dPNA PCR clamp; RECIST