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Cytology slides as source of tumour DNA for EGFR mutational analysis

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Aims: Since the discovery of activating mutations in the EGFR gene as the underlying mechanism for response to tyrosine kinase inhibitors, it has become of first priority, to be able to use, any available tumour sample for mutational analysis. Unfortunately, sometimes the only specimen available is a cytologic smear, and it is not possible to re-biopsy the patient. We evaluated the suitability of the cytology DNA for EGFR mutation analysis. We also review retrospectively the cases of non-small cell lung carcinoma (NSCLC), primary or metastatic, in which a cytologic smear was used to isolate DNA for EGFR mutational analysis by Sanger sequencing as a routine procedure.

Methods: We performed a retrospective study from January2013 to April 2015 of all the cases of NSCLC in which the specimen available for EGFR mutational analysis was a cytologic smear or Thin Prep. For those slides with more than 30% tumor content, cells were obtained for DNA extraction through direct scrapping of the whole slide. For those slides with less than 30% tumor content, DNA was isolated only from targeted areas using Pinpoint slide DNA isolation system (Zymo Research).

Results: In total 34 cytology slides were used for EGFR mutation detection during the study period. EGFR mutation detectionwas successful in 29 out or 34 samples, five cases were inconclusive due to suboptimal DNA quality. EGFR mutations were detected in 13 cases, of these, 5 had exon 19 mutations and 4 had exon 21 Leu858Argmutation. No mutation was detected in the remaining 16 cases.The EGFR positive mutation rate was 44.8% (13/29), which is comparable to that obtained using FFPE (formalin-fixed paraffin embedded) tissue in our laboratory.

Conclusions: DNA of adequate quality was isolated in 29/34 cytologic smears and Thin Prep slides (85%) and EFGR mutational analysis by Sanger sequencing was feasible in all these 29 cases. Cytology slides provide a great alternative as source of material for EGFR mutation detection when FFPE tissue is not available for lung cancer patient.

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