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Characterization of microRNA transcriptome in lung cancer by next-generation deep sequencing

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Non-small cell lung cancer (NSCLC) is the leading cause of cancer death. Systematically characterizing miRNAs in NSCLC will develop biomarkers for its subclassification and identify therapeutic targets for treatment. We used next-generation deep sequencing to comprehensively characterize miRNA profiles in eight lung tumor tissues consisting of two major types of NSCLC, squamous cell carcinoma (SCC) and adenocarcinoma (AC). We used quantitative PCR (qPCR) to verify the findings in 40 pairs of stage I NSCLC and normal tissues, and 60 NSCLC tissues of different types and stages. We also investigated the function of identified miRNAs in lung tumorigenesis. Deep sequencing identified 896 known miRNAs and 14 novel miRNAs, of which, 24 miRNAs displayed dysregulation with fold change ≥4.5 in either stage I ACs or SCCs or both relative to normal tissues. qPCR validation showed that 14 of 24 miRNAs exhibited consistent changes with deep sequencing data. Seven miRNAs displayed distinctive expressions between SCC and AC, from which, a panel of four miRNAs (miRs-944, 205-3p, 135a-5p, and 577) was identified that differentiated SCC from AC with 93.3% sensitivity and 86.7% specificity. Manipulation of miR-944 expression in NSCLC cells affected cell growth, proliferation, and invasion by targeting a tumor suppressor, SOCS4. Evaluating miR-944 in 52 formalin-fixed paraffin-embedded SCC tissues revealed that miR-944 expression was associated with lymph node metastasis. The miRNA signatures may provide biomarkers for subclassification, predicting metastasis of NSCLC, and identify molecular targets of the disease.

Biography

Feng Jiang's research activities have been in the field of understanding of the biological basis of cancer, and translating the new findings to the clinic, through the development and utilization of molecular, genomic, and other innovative laboratory approaches with direct relevance to the etiology, prevention, and detection of solid tumors. He has more than 60 peer-reviewed research articles. His research achievements in developing biomarkers for lung cancer have been reported in multimedia.

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