Cancer research advantaged in genetics and epigenetics progress

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Abstract Cancers now have been regarded as complex diseases caused by the abnormity of genetics or epigenetics and the most affective disease for the life of human around the world. In the last decade, it is an opportunity to identify more and more novel biomarkers in genome level along with the outbreak of biological data. For the current biomedical field, biomarker identification is also an important step for translational medicine. Meanwhile, earlier studies have identified many cancer biomarkers with genetic alterations. Genomics and epigenomics are playing more and more important roles in the treatment of cancers.

Keywords Cancer; Biomarker; Genetics; Epigenetics

With the development of oncology, more accurate biomarkers are still needed for the early detection of diseases. The biomarkers not only contribute to the early prevention, detection and prognosis of diseases, but also engage in the personalized medicine which could provide more effective treatment programs based on the characteristics of patients. In the last decade, it is an opportunity to identify more and more novel biomarkers in genome level along with the outbreak of biological data. For the current biomedical field, biomarker identification is also an important step for translational medicine.

Cancers have been regarded as complex diseases caused by the abnormity of genetics or epigenetics and the most affective disease for the life of human around the world. In the past ten years, we have focused on the researches in molecular level based on the development of the researches of cause and pathogenic mechanism for cancers and epigenetics is one of the most important research fields in our researches. Many biologists have realized that the pathogenesis of cancer is not only caused by the abnormity of genetic elements but also the abnormity of epigenetic modifications. Therefore, genomics and epigenomics are both the important research hotspots of cancer in post-genome time and the crosstalk between genomics and epigenomics could offer novel possibilities for cancer therapy.

Earlier studies have identified many cancer biomarkers with genetic alterations. For example, 

BRAF mutations happened in ovarian cancer and were identified as a candidate biomarker for the promising prognosis of ovarian cancer (Estep et al., 2007). However, epigenetic alteration is also one of the many important factors in cancers. Through the recent literatures, many epigenetically altered cancer biomarkers have been recognized. Recently, CpG island methylation alteration has been associated with cancer development, which is a common biomarker. For example, 

TFPI2 or GATA4 methylation has been found to be good predictors of colon cancer by examining patient excrement (Feinberg et al., 2006). In addition, RASSF1A has been predicted to be an indicator of poor prognosis in various cancers (Jiang et al., 2012; Wang et al., 2008). Partner of SLD5 1 (PSF1), a conserved replication factor in evolution, was demonstrated to correlate with diagnosis of cancers and was expressed differentially in prostate cancer. Therefore it was regarded as a biomarker to diagnose the patients with poor prognosis (Nagahama et al., 2010). The hypermethylation of PITX2 increased the risk of prostate cancer and could be a useful biomarker for poor survival (Vinarskaja et al., 2013). The up-regulation of methylation in Polo-like kinase (PLK) increased the probability of mutation and it was associated with oncogenes. The hypermethylation of P16 gene could increase the risk...
of esophageal cancer and also be a biomarker for the identification of esophageal cancer (Hardie et al., 2005). Therefore, molecular biomarkers may be useful for predicting the disease states of given patients.

In conclusion, genomics and epigenomics have important roles in the treatment of cancers. From now on, we will pay more attention to the field of cancer genomics and epigenomics. The amazing progress in this field will hopefully uncover the mechanism of cancers eventually. In addition, the creation of new methods for the prevention and treatment of cancers will aid discovering the potential cancer targets.

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