IncRNA profiling analysis for a better understanding of prostate cancer

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Prostate cancer is one of the most common cancers in men and, although it has been studied extensively for many years, there is still much to be learned with respect to its clinical diagnosis, prognosis, and mechanism. To better understand prostate cancer development, we used the human RT² IncRNA Cancer PathwayFinder PCR Array to evaluate cancer-related long noncoding RNA (IncRNA) expression in prostate cancer RNA samples.

Introduction

IncRNAs have been linked to the development of cancer and their potential as tumor biomarkers has been recently demonstrated. The IncRNA, PCA3, is used as a biomarker for clinical diagnosis of prostate cancer. Researchers are now becoming more aware of the important role played by IncRNAs in tumorigenesis and a variety of IncRNAs have been identified as oncogene or tumor suppressors. As studies of IncRNA have been limited so far, our knowledge of the many cancer-related IncRNAs is still in its infancy and only very few tumor types have been screened for changes in IncRNA expression. Better IncRNA profiling and more detailed studies of their mechanism of action will improve the understanding of cancer and its treatment.

Materials and methods

Total RNA from normal tissue control and prostate cancer tissue samples was analyzed (OriGene, MD, USA). The control group was total RNA from normal prostate tissue. Group 1 was total RNA from stage II prostate cancer tissue samples and group 2 was total RNA from stage III–IV prostate cancer tissue samples. The RT² First Strand Kit was used for cDNA synthesis (200 ng RNA/20 µl RT reaction) and the human RT² IncRNA Cancer PathwayFinder PCR Array was used for IncRNA detection with the RT² SYBR® Green qPCR Mastermix. Real-time PCR was carried out on an Applied Biosystems® 7900HT Sequence Detection System. The QIAGEN® PCR array analysis tool was used for gene expression analysis.

Results

With standard total RNA input (2 ng/25 µl qPCR reaction), 30–40% of cancer-related IncRNA can be detected at a Cq <30 with the human RT² IncRNA Cancer PathwayFinder PCR Array — thus, the RT² IncRNA Cancer PathwayFinder PCR Array simplifies IncRNA profiling. In contrast to normal control samples, stage II prostate cancer samples demonstrated significant changes in IncRNA expression (Figure 1). The biomarker, PCA3, was easily identified. The novel tumor suppressor
IncRNA, ADAMTS9-AS2, was also associated with prostate cancer progression. Rapid screening of samples showed that ADAMTS9-AS2 was down-regulated even further in stage III–IV prostate cancer samples.

**Conclusions**

- RT² lncRNA PCR Arrays profile lncRNA expression accurately and sensitively using total RNA from cancer tissue.
- While confirming lncRNA expression changes that are already known, RT² lncRNA PCR Arrays can help to link lncRNAs to cancer types that are less well studied and, thus, provide information on their role in different tumor types.
- Being able to correlate tumor stage with lncRNA expression enables lncRNAs to be used as potential biomarkers for clinical diagnosis and prognosis.